DEC 16 1912

COTTON

DECEMBER, 1912

THE ROBERT BISHOP MFG. CO.

Boston *New York* *Pittsburgh*

ESTABLISHED IN 1861

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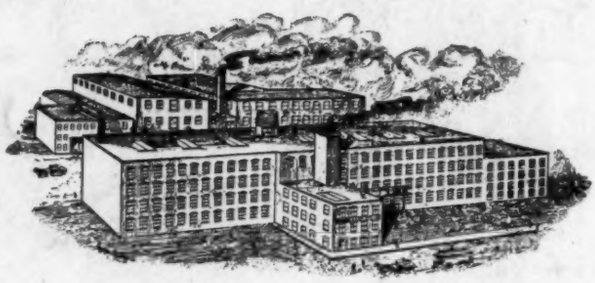
Hosiery
Railroad
Machinery



"Paragon"
"Arrow"
"Keystone"
(*TRADEMARKS*)

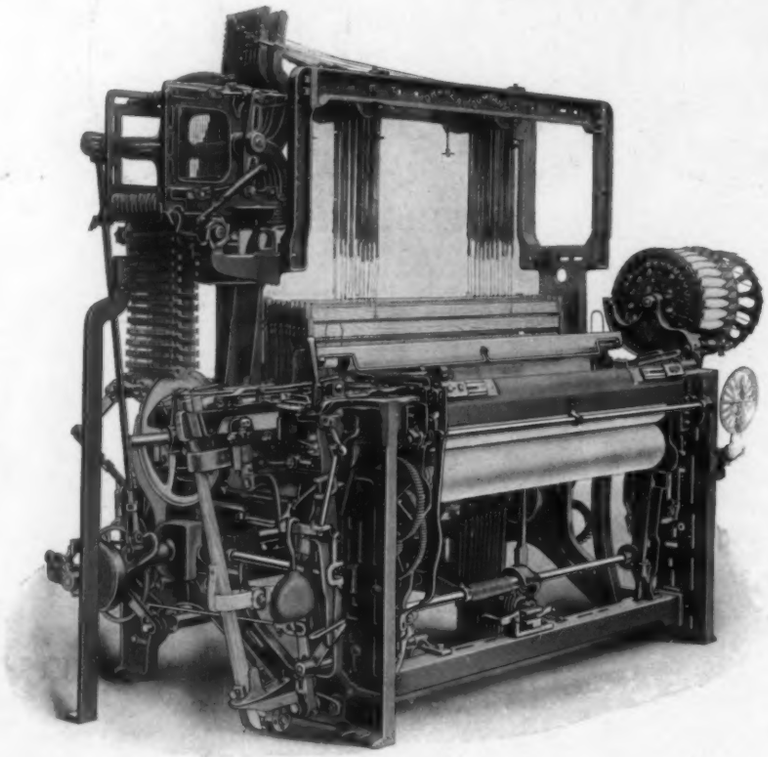
Waste **Wicking**

Oakum, Caulking Cotton

CONTRACTORS FOR

COTTON MILL WASTE

Alphabetical Index and Classified Index Following Reading Pages.



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TRADE MARK REGISTERED

EARN More Wages for the Weaver
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OUR RINGS

SET THE STANDARD FOR QUALITY

THERE ARE NONE OTHERS
"JUST AS GOOD."

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TRADE MARK REG. U.S. PAT. OFF.
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THE WHITIN MACHINE WORKS,

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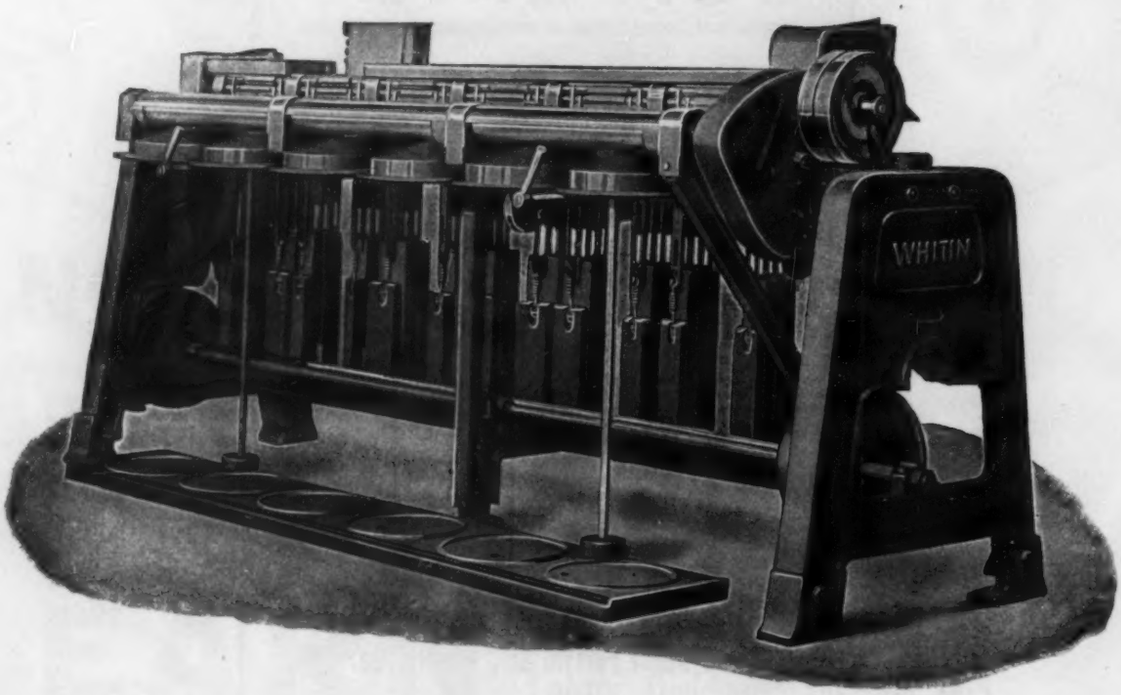
BUILDERS OF

Cotton Mill Machinery,



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Cards, Combers, Drawing Frames, Roving Frames Spinning Frames, Spoolers, Twisters, Reels, Long Chain Quillers, and Looms.

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COTTON MILL MACHINERY

CARDS
DRAWING FRAMES
SPINNING FRAMES
MULES
LOOMS
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LOOM CRANKS

A Specialty

For Repairs of Looms Built by Other Shops

Cotton Mill Equipment

By

Specialists.

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Pickers and Revolving Flat Cards

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FALES & JENKS MACHINE CO., Pawtucket, R. I.
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T. C. ENTWISTLE CO., Lowell, Mass.
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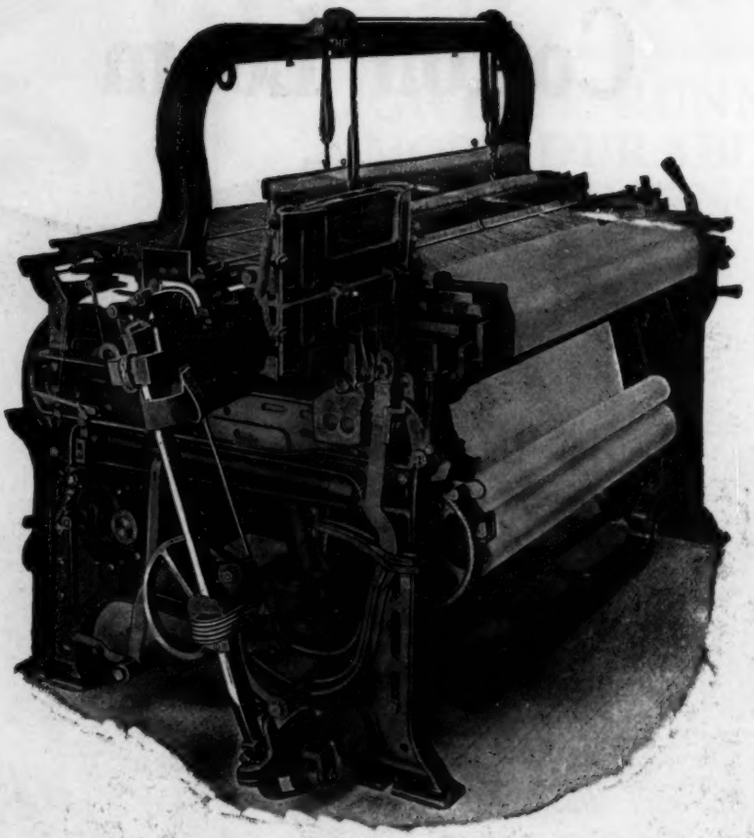
"IDEAL" AUTOMATIC LOOM



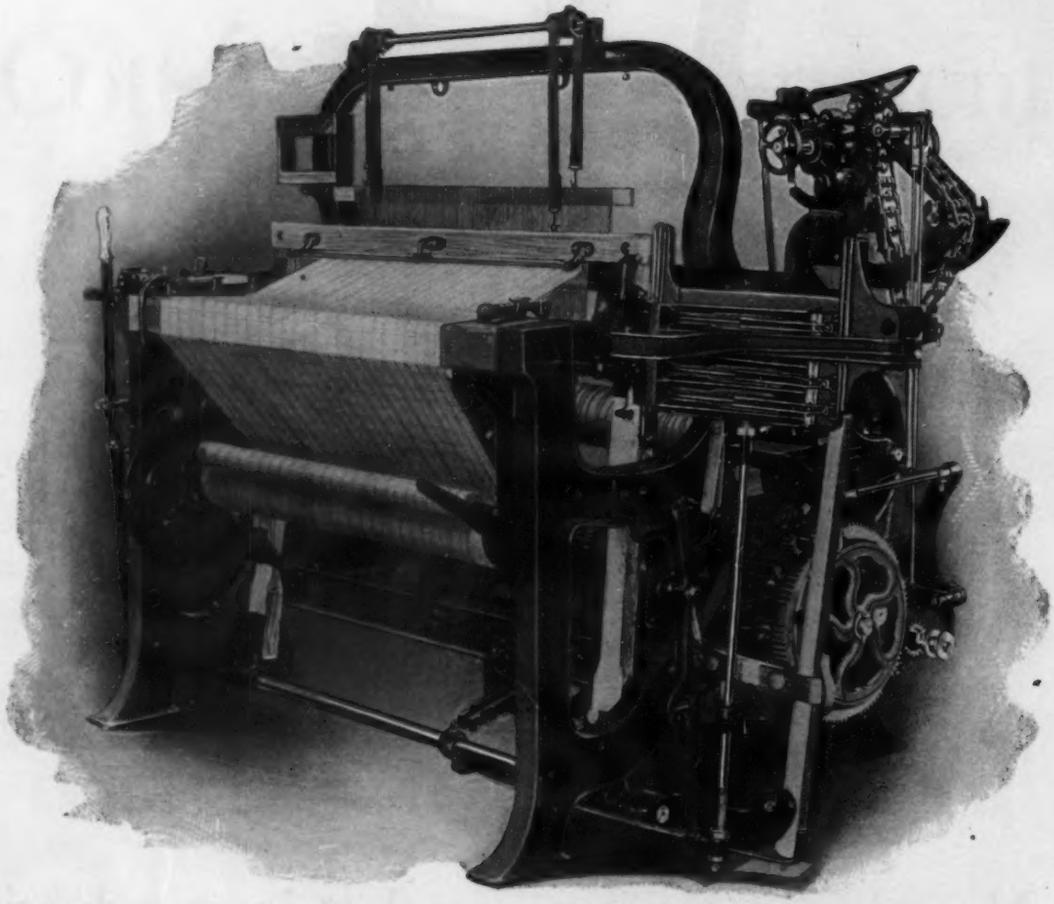
No other loom can equal it in production, quality of cloth, freedom from breakages and repairs and ability to use cop or bobbin filling.

THE STAFFORD COMPANY

READVILLE, MASS.

FRED H. WHITE, Southern Agent, CHARLOTTE, N. C.

Crompton & Knowles Fancy Cotton Loom



The loom shown on this page illustrates one of the many types of Fancy Cotton Looms built by the ***Crompton & Knowles Loom Works.***

It may be arranged for three, four or five harness and the usual combination of drop boxes are readily applied either to new looms or to old looms already in the mill.

Crompton & Knowles Loom Works,

Providence, R. I. WORCESTER, MASS. Philadelphia, Pa.

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LIGHTEST RUNNING
MOST DURABLE, and
MOST ECONOMICAL.

Have you seen our
1910 Diamond Finish

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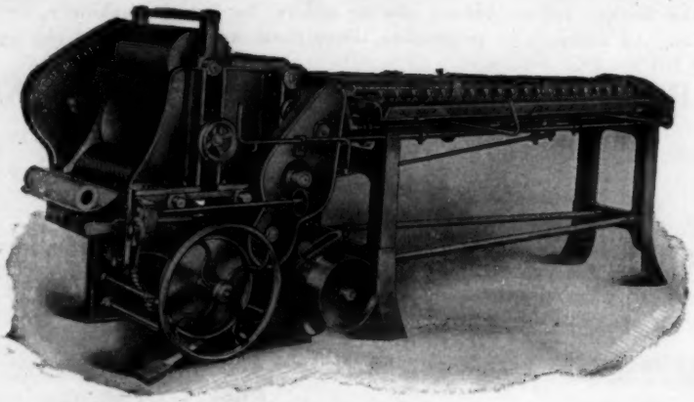
DOUBLE CARDING SYSTEM

Successfully Operated by Many Mills.



Information Gladly Furnished.

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Southern Agent, A. H. WASHBURN, *Charlotte, N. C.*

A Lace and Edging Machine That Runs Quietly at High Speed

Also adapted to manufacture of fancy knit goods, coats, sweaters, shawls, nubias, golf vests and their trimmings.

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KILBURN, LINCOLN & CO.

Makers of Looms for

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STEWART & SONS

MANUFACTURERS

LOOM REEDS

Jasper and Orleans Sts. PHILADELPHIA, PA.

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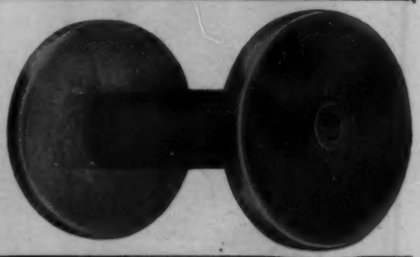

Did you ever attempt to prove that statement? Do it, for your own satisfaction. The magnitude of this waste is not readily apparent in the stress of other matters, but if you will apply yourself to the matter you'll see it is a big item on the wrong side of your ledger. Our METAL PROTECTED SPOOLS will save practically all this loss for you. They rarely ever break or separate. When you consider that it's the full spool which breaks, you'll see why our METAL PROTECTED Spools save you big money. The metal does not rust or stain the yarn. It protects both the outside and inside of spool. We are making a special trial offer to mills who have never used our spool. Write for this offer and sample spools at once. ADDRESS ☞

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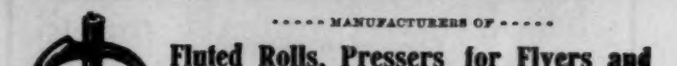

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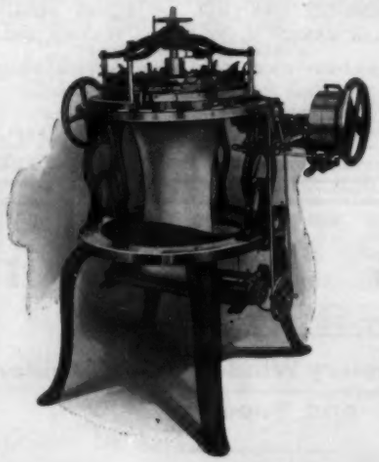

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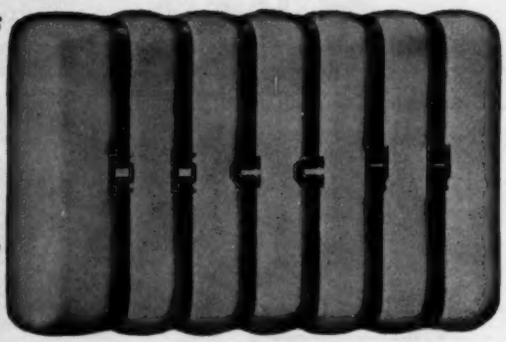
Spread every 6 inches for nails. Put up in coils of 4000-5000 feet. Wooden reel furnished.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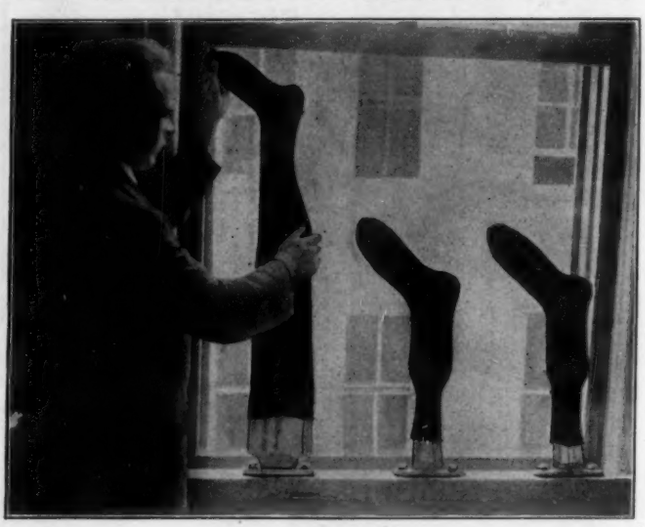

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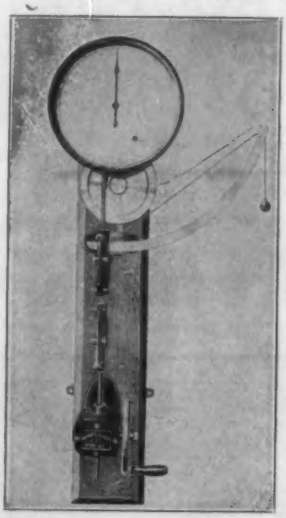

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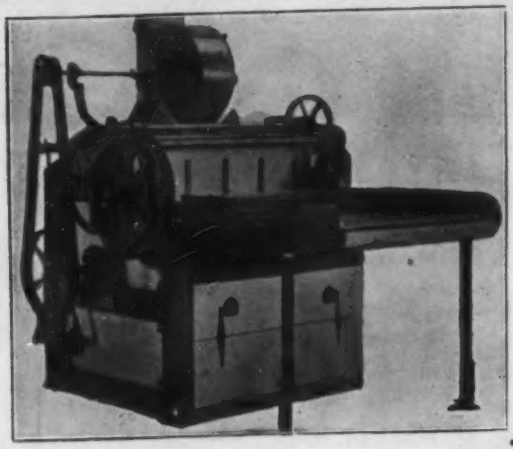

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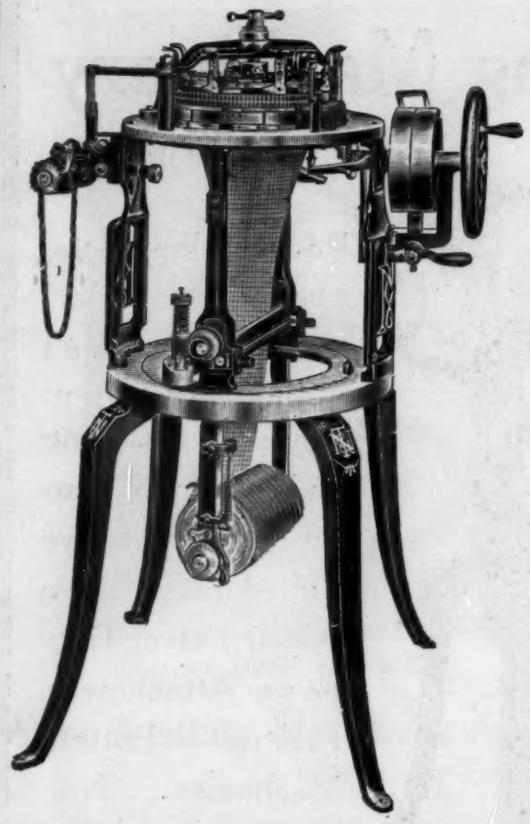

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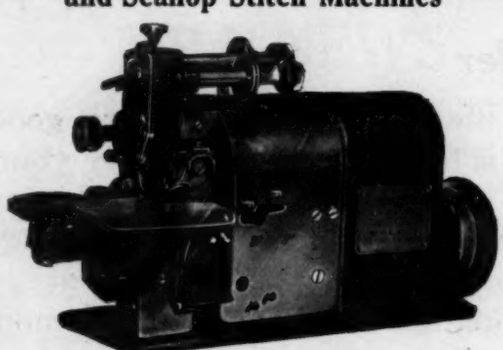

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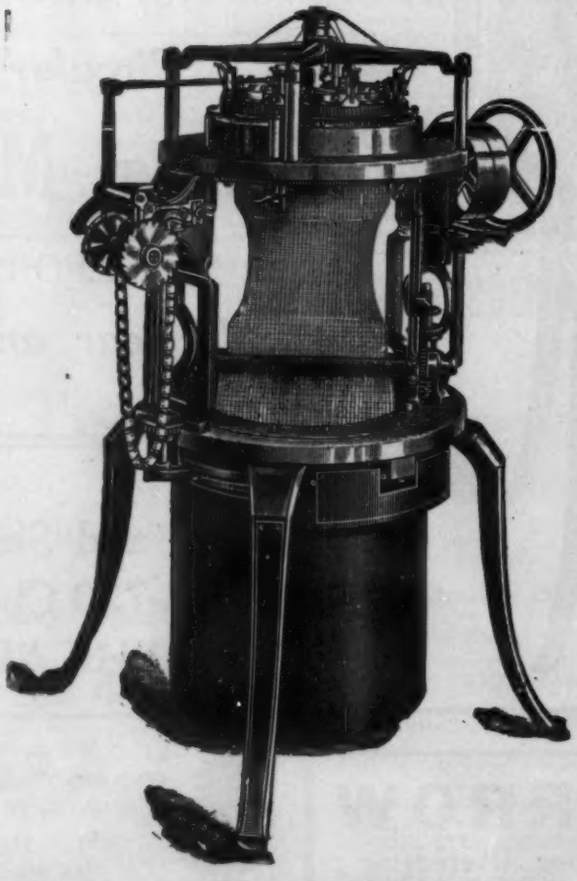

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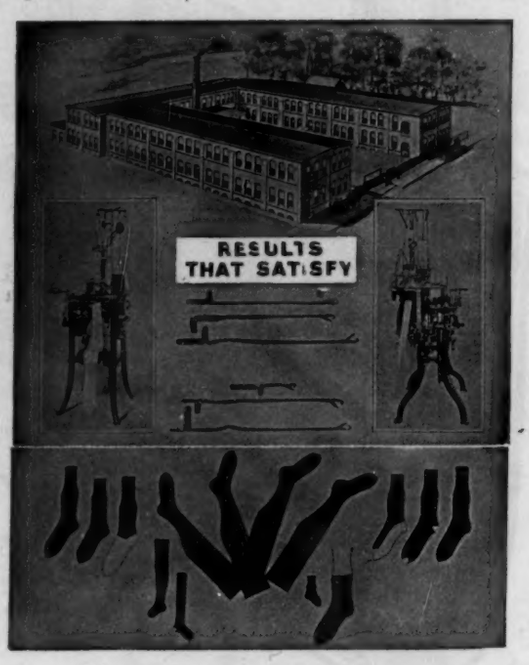

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Mill News Employment Bureau

which is entirely distinct from the newspaper advertising and is especially intended for Superintendents, Overseers and men in the higher positions, who are already employed but can safely use this confidential means of securing better positions.

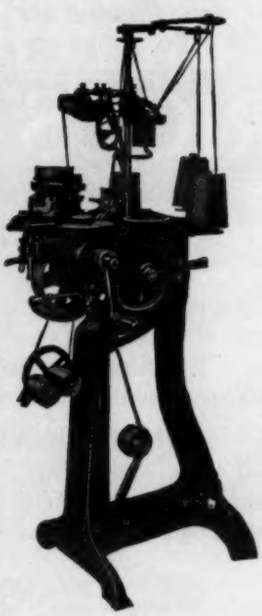
If you will kindly inform us, as far as possible in advance, just what kind of man you want, stating amount of wages, etc., we shall take pleasure in helping you; and it will be our rule not to recommend any man for a position unless we have a personal knowledge or positive assurance of his fitness for the same.

We shall appreciate any communication from you along this line and feel safe in saying that we are in better position than any one else to render you such service.

Yours very respectfully,

Mill News Printing Company,

CHARLOTTE, N. C.



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Interior of Spinning Room Before Using Rice's Mill White.

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YEARS ago the makers of Rice's Mill White recognized the necessity of an interior white with greater light-reflecting power and greater permanence than any then known. Cold water paints and others had proved short-lived or a source of constant annoyance because of flaking. Experiments finally revealed a way to treat linseed oil and other vehicles that would give *elasticity, free flowing* and *high gloss.* This is the secret of

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Not a Cold Water Paint

"The Paint that Brims Over With Sunlight"

It is a paint of great opacity, firm, glossy and able to stand the disintegrating force of expansion, contraction and mill vibration *without flaking and scaling.* It retains its brilliance longer than any other gloss white and under ordinary conditions will not turn yellow.

Rice's Mill White flows freely under the brush—and never drags. A painter will actually cover 20% more surface using this white than he will using any similar paint. Scientific tests have proved that Rice's Mill White increases inside light—depending, of course, on local conditions—from 19% to 36%.

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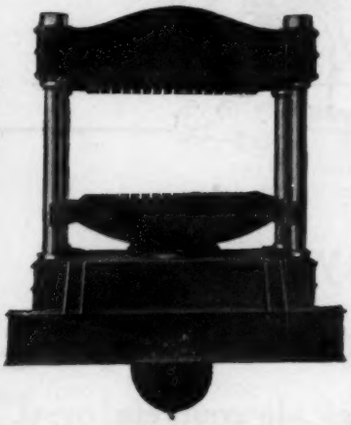

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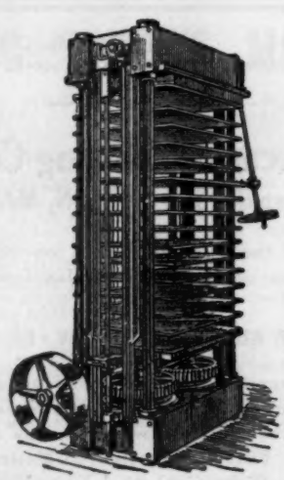

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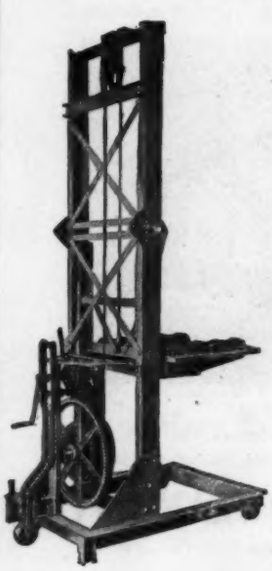

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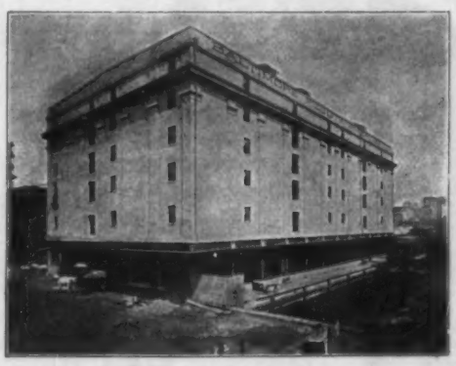

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"They toil not, neither do they spin; even Solomon in all his glory was not arrayed like one of these."

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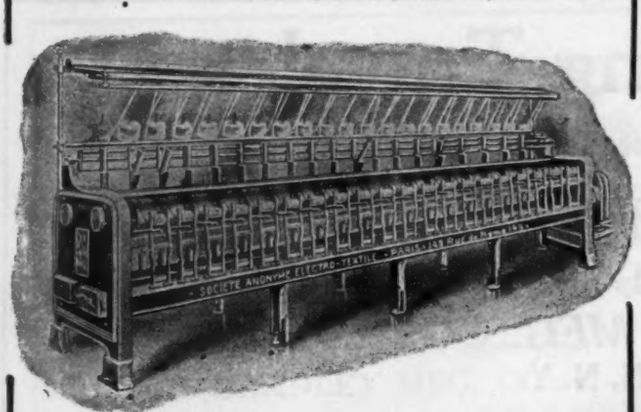

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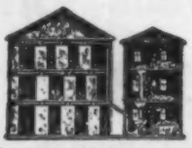

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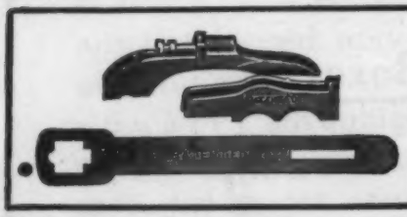

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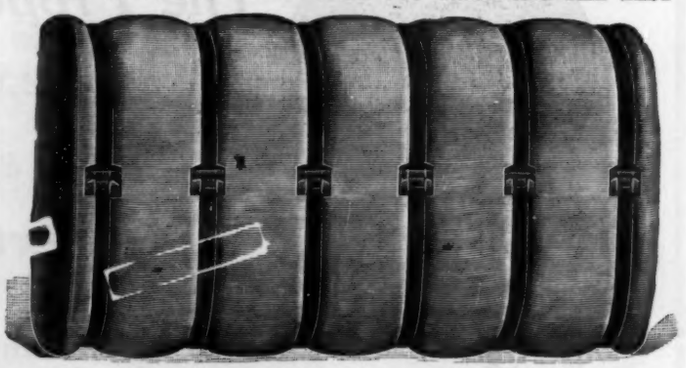

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Buckle can be applied with the Locking or Hook part next to the Bale, so that there is no possibility of its getting caught in other Bales when piled together.

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A LOOM must be started abruptly so that the shuttle will box on the first throw. A warper, on the other hand, must be started slowly and smoothly to avoid breaking the threads. Other textile machines have different characteristics that must be met. It is evident that one and the same motor cannot be used to drive different kinds of machines.

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Westinghouse experts in the drive of textile machinery are prepared to assist textile manufacturers in obtaining the most efficient and satisfactory motor drive for their mills.

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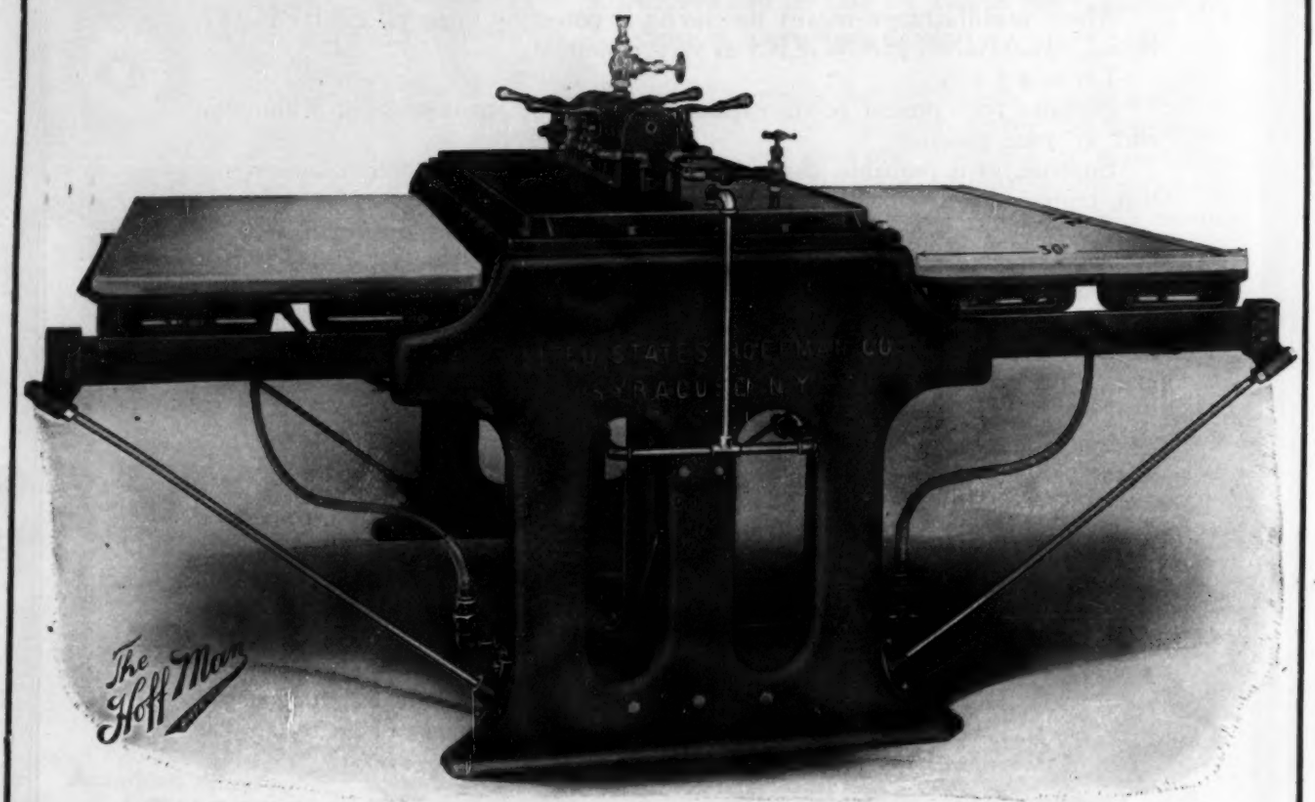

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Manufacturers who press knit goods the "HOFF-MAN WAY" know their product shows to the best possible advantage.

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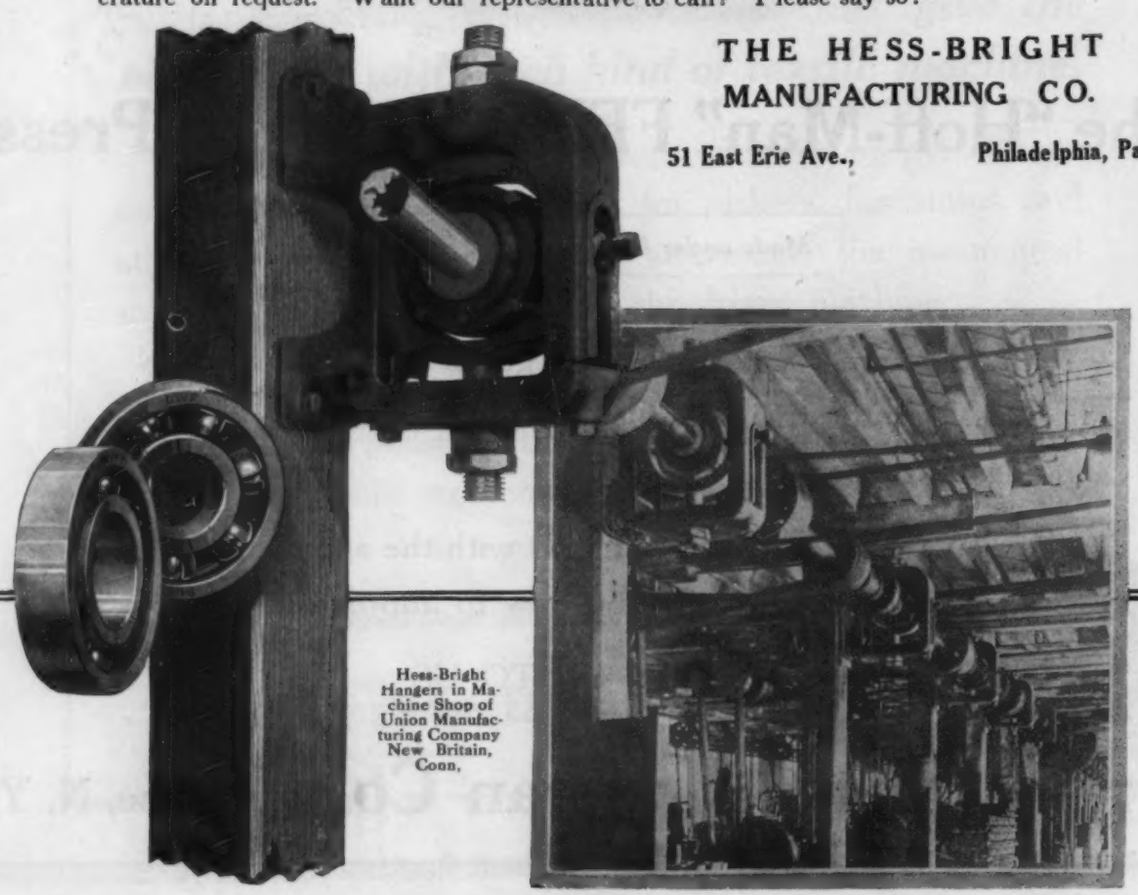
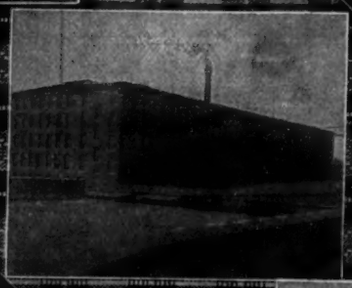
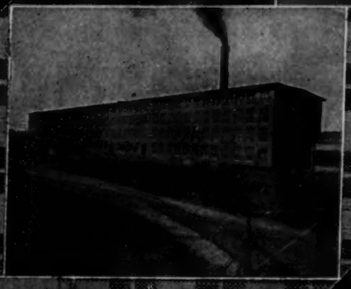
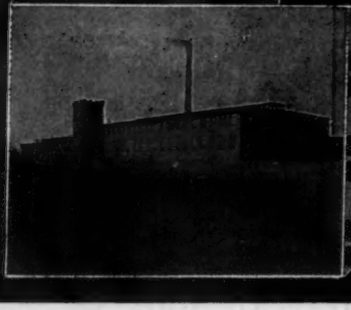


Hess-Bright Hangers in Machine Shop of Union Manufacturing Company New Britain, Conn.







Over 10,000 H.P. of G-E Induction

Motors are in Use in These Six Greenville, South Carolina, Mills.

That up-to-date electric motor driving is popular in the South is shown by the fact that in one city alone over 10,000 h. p. of General Electric Company alternating current 3-phase, 60 cycle, 550 and 2200 volt motors are in use in six of its mills.

Subdivision of power in these mills does away with excessive line-shaft friction losses and gives increased production at less power cost over the results obtainable by steam engine line-shaft drive.

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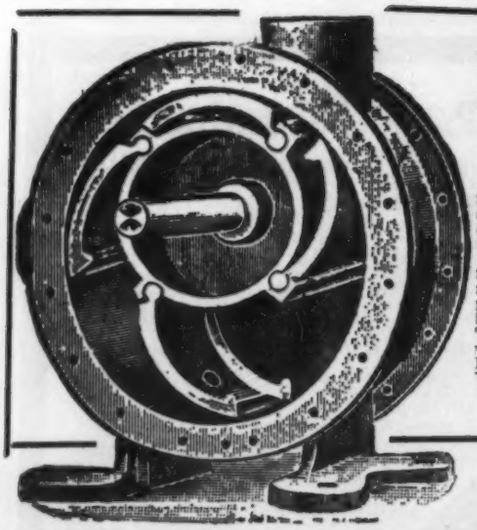

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VACUUM CLEANING

2 to 338 cu. ft. per min. 1 oz. to 10 lbs. pressure. 1 to 20 in. vacuum. Take up their own wear.

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COTTON

PUBLISHED MONTHLY

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INDIVIDUAL RATING IN LIABILITY INSURANCE.

In view of the number of states which have adopted workmen's compensation laws, and the growing tendency of legislators to consider action of this kind, it is probably true that the question of accidents and their prevention is one of the most important with which the American manufacturer has to deal. Even though the textile manufacturer may have his plant in a state where there are no laws requiring the payment of compensation to workmen, and where contributory negligence, voluntary assumption of risk and other factors which may be used to defend suits for damages tend to reduce the amount which must be paid for accidents in his plant, things are working out so rapidly in this direction that the most progressive members of the trade are already trimming their sails so as to be in a position to accept a compensation law gracefully if not with equanimity.

Mill owners will probably be interested to learn that the liability insurance situation is gradually assuming a more scientific and exact aspect. That is to say, the growing importance and cost of this class of protection, which is now regarded as absolutely necessary, coupled with the rapid increase in the number of states where compensation laws are in effect, has practically forced the companies to decide to put into practice what they have long believed as a matter of theory; that is, that each risk should be individually rated, instead of being asked to pay a rate fixed by the experiences of the class to which it belongs.

While the individual system of rating will be applied first, of course, to those states where compensation statutes are on the books, since it is most necessary in those sections, it is now practically certain that the plan will be extended to the country at large, for a company using the system could hardly refuse to extend it to all sorts of risks, especially since its adoption in one place means an admission of its general desirability and accuracy.

The situation in a nut shell is this: Why should a manufacturer who spends money, thought and effort to make his plant as safe as it is humanly possible to make it, be compelled to carry the burden of some other plant which is allowed to run under any conditions whatever as to the accident hazard? This, of course, is the situation where the class rate is used, and it is obviously unfair. The schedule rating system, which is now in process of adoption, will do away with all this and will put every tub on its own bottom as far as liability or compensation rate is concerned.

The analogy which is most correct and offers most points for comparison is the use of the schedule rating system in fire insurance. A fire underwriter who attempted to charge every cotton mill owner the same rate as that applied to every other plant of that kind, would be deemed a fit subject for the efforts of a lunacy commission; yet, that is exactly what is done when the liability company fixes its charge for the protection it offers. Just as fire protection facilities, construction and the individual features of

"housekeeping" which mark a plant determine the hazard and consequently the rate from a fire underwriting standpoint, so does the use of safeguards or the lack of them; the adoption of proper instruction or its absence; and the general morale of a plant, determine the extent of the accident hazard and consequently should determine the rate. There is no good reason why the rate should not be fixed accordingly.

The liability companies have been considering this subject for some time. An effort was made early in the year to have schedule rating undertaken by a bureau of the companies, but because of lack of concerted action this has not been done. The extension of the workmen's compensation laws into additional states and the growing demand for a better rating system originating both inside and outside of the ranks of the insurance men, have led individual companies to undertake the rating of isolated risks in the "compensation" territory, and, as indicated above, its rapid extension to other sections may be safely prophesied.

An insurance authority connected with a company which will use the new idea said recently:

"Considering the great increase in the cost of industrial accidents under these new conditions (workmen's compensation laws) and the incentive thereby created to prevent every preventable accident, the 'merit system' of rating manufacturing risks for workmen's compensation insurance is the only sensible and logical method.

"The adoption of a definite standard for all physical exposures as represented by buildings, machinery and other equipment, is involved. A most thorough and comprehensive inspection of buildings, machinery and other equipment, including a detailed report as to the nature of the product and methods of manufacture, insofar as they affect the accident hazard, must be made. The application of proper debits and credits for all substandard or superstandard features, as disclosed by inspection, is required, the purpose being to give every employer the full benefit for the adoption of safeguards and safe methods of working.

"The experiments thus far conducted with the merit system demonstrate its practicability beyond question, and while the very elaborate inspection required will involve no little expense, we believe this additional expense will be amply justified by the adoption of a rating system obviously equitable to the insured and designed to reduce the ultimate cost to a minimum by encouraging the adoption of the best known safeguards and safe methods."

The use of a system of this kind will mean that the plant which is not properly cleaned up and protected in this respect will be given a prohibitive rating, and one which will force its owners to improve in order to be able to get the needful protection. Thus it will bring down the sum of total accidents and their cost, and ultimately should reduce rates. It will mean a lower average rate, in the end, and the selfish interests of the insurance companies lie in that direction. As in fire insurance, the largest profits are made chiefly on low-rated business; for high-rated risks carry a hazard sometimes greater than the rate would indicate, since all of the defects are not always charged for.

The cotton manufacturer, taken by and large, is probably a little more progressive as to accident prevention than his brothers in other fields. The fact that female labor is employed in large proportion has resulted in more care being taken to eliminate possible sources of danger that might not have been thought worthy of this attention if only men were affected. And many of those in the business have gone a bit further than necessary, according to the letter or even the spirit of the statutes under which they are operating, and have done all they conceive to be even remotely desirable from this standpoint.

For instance, a textile manufacturer in an Ohio Valley city, who is known for his care in this respect, has taken the precaution of having all doors open outward, so that in case of fire there would be no possibility of the repetition of holocausts which have happened because of inward opening doors. All elevator openings are locked, so that when the operator leaves his car, no one can get into it. This is extremely important, for the illegitimate use of the elevator is one of the most prolific sources of accident in industrial plants of all kinds.

Signs are posted conspicuously everywhere, urging employes not to attempt adjustments or repairs of machines that are in motion. "Stop your machine when you are making changes or repairs," is the warning that is shouted at every employe from the placards that are located in all parts of the building, and while this does not prevent the man who won't think and can't be made to think from putting his hand under a rapidly revolving cotton beater, or withdrawing the hood placed there for his protection, it does act as a warning, and prevents many thoughtless employes from attempting the dangerous operation of changing the adjustment of a machine that is in motion.

The more obvious machine hazards are of course taken care of. In most cases machinery builders themselves supply or suggest guards and hoods for parts which offer serious hazards, while the danger of unboxed and exposed belting can easily be disposed of by a few simple and easily taken precautions.

The man whose plant is ideal in this respect is at present paying the maximum rate. Or, to put it a little more accurately, he is paying a composite rate, made up of the experiences of all the companies writing that class of business, so that his rate is based on the showing made not only by his own plant, but also by those of everybody in his state or section, the rates as a rule being made up for one state at a time. Thus, if he happens to be the exception to the rule, and most of the plants similar to his own have relatively dangerous conditions, he is forced to help pay the expenses of their accidents and gets no credit for the excellence of his own provisions.

"I have spent a good deal of money to make my plant safe," said one of the largest cotton mill owners in the Central South. "I have done it, first, because I think that accidents reduce the efficiency of a plant, and, second, because no humane owner wants to have people hurt while in his employ if he can help it. So we have done everything the liability companies have suggested, and at the same time have called on our superintendents and foremen for suggestions, which have been given in sufficient number to result in a marked improvement. There is nothing that we know of now that could be done to improve the situation in our plant. If there were, we would adopt it.

"All along, however, I have realized that I have been done an injustice by being charged the regular class rate. I know that my experience has been such as to enable the company handling my business to make more than an average profit, and have realized that this profit has been used to make up for losses on some other properties. I should much prefer to be rated individually, and I feel that I should make a decided saving in this way, and thus get the benefit of my investment in special facilities for accident

prevention. I am glad that the companies are approaching the situation from this standpoint, for I believe it is logical and necessary."

Plant owners who have not given the subject full attention, and who have not taken all possible precautions to make their plants safe, will probably have a stronger incentive with the individual rating system in effect than is offered now under the class system of determining the charge.

SOUTHERN DEVELOPMENT.

Little by little that section of the country termed the South is receiving merited recognition, not only because of its vast natural resources, but also because of its rapid development of those resources. The following editorial from one of the country's best known business dailies, the *New York Commercial,* is a typical example:

"There is nothing in our whole surprising field of achievement more amazing, we think, than the harvest of success that the Southern section of this country has reaped since the Civil War. What ravage and ruin that cataclysm affected, only those who traveled through the South just after the final surrender can ever appreciate. No one journeying through that prosperous and blooming land now can ever grasp the extent of the isolation and disheartenment which lay like a pall on everything and everybody. Today the South if not the most prosperous is at least equally so with any part of the United States, with possibilities in the future surpassing that of any other.

"It is true enough that the early awakening, when the dismal days of reconstruteion were ended, whien almost perpetuated the woes of trampling armies and crushing defeat was largely due to the fertilization of northern capitai, which sought to exploit its own gains as well as to benefit the South. But without two things influx of capital would have failed. Indeed, it was on that account that influx of capital poured in. The first was the almost inexhaustible wealth of the South in natural resources, and the second was the perception of the North that the indomitable strength and energy of the Southern nature once fairly aroused was capable of almost any achievement within human reach.

"Since northern capital and enterprise began to pour itself out for Southern investment in the early seventies and in continually increasing volumes, too, one notable fact stands out in great significance. That is the demonstrated truth, as we gather from various sources, that in the enormous manufacturing, mining, commercial and agricultural wealth there, today shows a much greater ratio of Southern ownership than of Northern. Even the stocks of Southern railroads, a form of investment which draws its supplies from such widespread sources, are very extensively, perhaps in major extent, in Southern hands. Her manufacturers, we are informed, tell the same story, and of course it holds much more extensively in the fields of commerce and agriculture. All this amazing recrudescence makes Southern industrial evolution one of the most striking episodes in our history as a nation, crowded as it is with an amazing roll of things achieved in a comparatively short time. On the part of the South that awakening did not really see very much, we must remember, till what we call the reconstruction period was wiped off that political slate, which it so blackened and defaced. Some day a competent historian will be found whose pen will compose one of the most fascinating stories ever written in an adequate summary of all the facts which enter into some forty years of such triumphant struggle and achievement.

It is in the manufacturing and farming evolution that the most striking phases are found. The iron and steel mills, aside from the operations of one or two colossial corporations, which have made up so big a part of the national production, work on more than a usual scale of success and even more favorable conditions of competition than those of the North. The cotton mills are quite as notable as those of any region. In both these directions there is good promise that the future will witness a greater ratio of advance than can be hoped for in the North. The agricultural evolution is so great in so many ways that its story alone is one of vast interest and importance. In truck farming alone the annual supply to the markets of the North has become a most striking factor in the sum total of the industry, which depends directly on mother earth. The South has lost its grip on none of those products of the soil which formerly constituted its largest dependable wealth, and it has added vastly to them in the multiplicity and value of the newer directions of effort.

"There are not a few who profess to be soothsayers of the future, who believe that in the next fifty years the South will be as superior in wealth to the North as was the reverse ratio fifty years ago. We do not agree with this, for the North must include the vast West. But its progress will be as unbroken and brilliant as it has been since it first raised its head from the dust of defeat and desolation even if not so picturesque or pathetic, we may rest assured. Nowhere has been or will be more interest in and sympathy with such results as in that North which laid the foundation for it in such terrific subsoil plowing. The North builded wiser than it knew, and the South suffered more auspiciously than it knew."

An apparently important deposit of potash has been discovered at Borax or Searles Lake, in the northwestern corner of San Bernardino County, Cal. This deposit is in the bed of what was formerly a great lake, now almost dried up, whose central depression contains a large body of crystalline salts, saturated with brine. Samples of this brine, taken from six wells distributed over the salt flat, showed an average of 6.78 per cent of potassium oxide (K_2O) in solution, and an average salinity of 43.82 grams of solids per 100 cubic centimeters.

The importance of the deposit is due to the occurence of the potassium salts in soluble form in a natural saturated brine, under conditions especially favorable to its separation and recovery by solar evaporation. The bed is estimated as at least 60 feet thick and covering 11 square miles. A very conservative estimate places the amount of potassium oxide at 4,000,000 short tons, but the available tonnage may well be expected to exceed 10,000,000 tons, which would supply the country at its present rate of consumption for 30 years. Other minerals found in the Borax Lake deposits include borax, gypsum, glauberite, carbonate and sulphate of soda, salt, thenardite, and hanskite, the latter salt carrying as high as 2.33 per cent of potassium.

IS PROTECTION BENIGN?

Has Our Tariff Wall Built up an Exotic Industry Unsuited to the Location and Burdensome to Our People? If This Is True, Why Not Have an Excise Tax on Home Manufactures Equal to the Tariff on the Foreign Product?

Contributed Exclusively to COTTON.

BY WILFORD I. KING, PROFESSOR OF POLITICAL ECONOMY AT THE UNIVERSITY OF WISCONSIN.

CHAPTER 4.

I am pleased to see that Mr. Simons has finally decided to make the debate a little more definite and I appreciate his courtesy in doing so. I can also assure Mr. Simons that no thought of taking umbrage at any of his remarks has ever occurred to me and I trust that he likewise will never consider that any of my attacks upon his theories have a personal bearing, for such is far from being the case.

I cannot agree with Mr. Simons in his classification by which he placed economists in general in the category of wild theorists or visionaries. While his definition of economics is correct enough for practical purposes it does not necessarily follow that the business man is the one best fitted to work out the science of business. Are improvements in steam engines mostly made by the engineers? Have the great electrical discoveries been worked out by the motormen or the men who wire our houses? Have the improvements in agriculture been mainly the work of farmers? In this day of specialization the man who succeeds in business has little time to devote to the general problems of business from the social standpoint. His especial undertaking occupies his time and talents. Like the lumberman, he doesn't see the forest for the trees. So, just as in other sciences, the general laws and principles of political economy can only be worked out by men who devote their lives to the study.

It might be mentioned also that our great economists are not at all unfamiliar with the practical affairs of business. True, they usually do not pretend to know much of the technique of industry, for this is not their province, but with the general fields of agriculture, manufactures, and commerce, they are ordinarily well acquainted. Anyone who reads The Wealth of Nations can scarcely accuse Adam Smith of ignorance of the business affairs of his day. David Ricardo was a successful banker and John Stuart Mill worked for many years in the India House. Of the economists of my acquaintance, nearly every one is thoroughly familiar with one or more of the fields of trade and industry. True, that is not their chief work, but it prevents economic theory from becoming in any way separated from the actual facts of real life. Economics has not been entirely reduced to an exact science, but many of its laws have been thoroughly established, and while the efforts of business men may be very helpful in correcting the details, it is only in case that they become expert economists, as well as business men, that they can hope to do much in furthering an understanding of the fundamental laws governing trade and industry.

Again, I agree with Mr. Simons that the tariff is not to any great extent responsible for the recent increase in the cost of living. Likewise, the wastes of competition cannot be responsible for the increase for they have been going on all the time. I, too, am in hearty accord with Mr. Simons in admitting our debt to the socialists for their part in pointing out the wastes of competition. I, also, would say emphatically that the fact that these wastes have gone on for centuries is no argument for allowing them to continue. The sooner they can be eradicated without bringing more serious evils, the better it will be for all concerned.

Perhaps Mr. Simons will be glad to learn that in all elementary classes in economics with which I am familiar, the students are taught that the price of the goods ordinarily includes all the costs of advertising, salesmen, etc., and the fact is clearly brought out in classes in Public Finance that there is no foundation for the idea that this generation can shift the cost of the Panama Canal to our descendants. These facts are set forth in all modern treatises dealing with these subjects.

Mr. Simons complains of quibbling on words in discussing the services of the merchant and then himself proceeds to substitute the word "availability" for "utility." We need not dispute on this score. To the economist, the term "utility" means "power to satisfy human wants." Lumber in the lumber yard better satisfies the builder's wants than standing timber in Oregon. Similarly, to the housewife, at 7:30 a. m., meat in the market around the corner is more useful than the same kind of meat in the Chicago packing house. The local dealer makes it more "available." It has therefore greater "utility" to the housewife. This is what the economist means when he says that the merchant produces utility. Neither manufacturer nor farmer can produce aught else. They can only add utility to existing things. If one is not a producer, neither is the other. But it seems a pity to occupy the valuable space in COTTON with a discussion of so many irrelevant subjects. I shall attempt to return to arguments having some bearings on the tariff question.

Mr. Simons again cites the fact that both money and real wages are *much higher* than abroad. Fortunately, this is true. He also states that the *wages cost* of certain manufactured articles here is more than it would cost to lay the imported goods down in the New York custom house. Doubtless this is true also. He then asks if these manufacturers could pay such high wages if protection were withdrawn. Most certainly not. They couldn't operate at all, but would be forced to the wall. Their factories would be closed down. Thousands would be thrown out of employment. Distress would result to many during the process of readjustment. All this is most true and it is all proof of the fact that our tariff wall has built up an exotic industry unsuited to the location and burdensome to our people. It means that every consumer has for years been paying an exorbitant price for this class of products and that by so doing he has so diverted capital and labor into this unprofitable channel that there will be much hardship and waste involved in the process of getting it back once again into lines of maximum productivity. We must not, however, in thinking of the wages of the employee in the protected industry, forget how

the other employees who work in other industries are constantly having their *real* wages reduced by paying exorbitant prices for the protected products. And, after all, the employees of the protected industries form a decided minority of our population.

Mr. Simons' states that labor engaged in American transportation is wholly protected from European competition. I do not pretend to be especially familiar with the field of transportation, but I know of no reason why an English or German locomotive engineer or fireman or brakeman can not come to America and in a comparatively short time be engaged in moving our trains. I am quite sure that foreigners freely compete for positions as motormen, street car conductors, teamsters, freight handlers, etc., yet in all these lines, which are unprotected, we find both money and real wages much higher than for the same work in Germany or France and ordinarily higher than the wages paid in the American textile mills. I trust this answers the query as to how European laborers compete in transportation. Will Mr. Simons now kindly explain why the protected textile mills pay lower wages than our railroads or even our street railway companies? I would also ask Mr. Simons if in the ills of Lawrence, for example, he finds that "benign protection" has, in practice, prevented "the overstocked labor markets of foreign countries from being a factor in determining the price of labor in this country." Newspaper reports tell us that Lawrence is crowded with cheap foreign labor—men and women who have cut wages below the standards of the prosperous American workingman. But surely Mr. Simons will show us that these statements are base calumnies on protected Lawrence.

Mr. Simons balks at carrying his arguments to their logical conclusion. He admits it would be undesirable to establish the tea-growing industry in the United States by the process of erecting a tariff wall. Why? Because China is better adapted to the tea-growing. Has it occurred to Mr. Simons that perhaps England is better adapted to woolen manufacturing? If it is not, they can not successfully compete in our markets and protection is evidently superfluous. This principle has been fully explained in an earlier article.

I must also repeat my request to Mr. Simons to use the terms value and price separately and not interchangeably since the two ideas are distinct. I do not see why he should object to the definitions of these terms accepted by the majority of economists. Value may be expressed in any commodity. Price is only one kind of value, money-value, and can be measured only in money. The argument will be made decidedly clearer by using clearly defined terms throughout. I must admit that I do not know a meaning for the term "intrinsic value." If the words have any clear meaning, which I greatly doubt, I shall be glad to learn exactly what Mr. Simons understands thereby. How is the term "intrinsic" affected by considerations of time, place, and persons interested in the commodity?

In regard to a general rise in prices not benefitting labor, Mr. Simons apparently contends that the laborers get higher wages, but the capitalist gets the same for his capital and the entrepreneur the same for his services as before. It is well to remember that the capital is produced by labor and when wages rise, the cost of buildings and machinery will increase also. It seems to be doubtful that intrepreneurs have not received as large a percentage of addition to their profits in recent years as have laborers in wages. Statistical proof would be necessary to overthrow the general impression in this line.

Since Mr. Knight also has taken up the cudgel for protection, it might be well to say a few words in reply to his article. I must decline to discuss the merits or demerits of college endowments. These may, as Mr. Knight affirms, be as worthy of condemnation as the protective tariff, if so, college endowments should be abolished. But this has no bearing on the tariff which we are discussing.

Is it true that if the tariff were removed our manufactures would disappear? If so, there is no doubt that the factories are out of place. Personally, I believe nothing of the sort would happen in most industries. It is self-evident that many of our industries produce as cheaply as those of any nation on the globe for they compete successfully in the world's markets. Why do these lusty infants need protection?

I know of no reason why a revenue tariff should not be levied on manufactures as well as on other articles, on things which we can produce as well as on things that we cannot. If the government needs further revenue, why not levy an excise tax on home manufactures equal to the tariff on the foreign product? This would still leave "a fair field and no favor."

It certainly must not be assumed that because protection is economically unsound that it might be safely eliminated at once. The shock of readjustment would probably do more evil than the continuance of protection. The removal of duties should be gradual and systematic, allowing a period of years in which capital and labor could readjust itself and take its place in the most profitable industries—those industries capable of standing on their own feet and competing with the world at large.

As to the attempt to lay world-wide panics and crises at the door of American tariff legislation, this may be suitable as political buncombe, but hardly has aplace in a serious discussion on the subject of the tariff. It is only a shade more logical than connecting wars with comets. Likewise, a newspaper reporter's opinion as to the effects of a reduction in the sugar tariff can hardly be considered a final and conclusive statement of the facts upon which to analyze the question at issue. It is desirable to keep the discussion decidedly above a campaign argument.

The Asahi Spinning Co. has recently been formed in Osaka, Japan. The company recently bought 120,000 tsubo (tsubo equals 3.954 square yards) of land at Shigino-mura, in the suburbs of Osaka, as a site for the spinning mill, the price paid being $300,000. In anticipation of future developments, the company has decided to reserve 50,000 tsubo for the mill and to carry out improvements on the remaining 70,000 tsubo, with a view to disposing of this property when the value of the land has gone up to $1 to $1.50 per tsubo. The mill machinery and plant already ordered from abroad are expected to arrive in time to be erected and running by about May next.

A trading company in the East Indies has requested an American consul to put it in communication with American exporters of Pepperell drill cloth and other cotton piece goods. The company authorizes exporters to draw upon it against documents through its bankers. When writing to the Bureau of Foreign and Domestic Commerce concerning this note, refer to file No. 9337.

INDUSTRIAL EDUCATION

Only Three Courses are Open to the American People---Export Our Raw Materials, Import Our Skilled Labor, or Educate Our Boys and Girls Industrially

BY G. GUNBY JORDAN, PRESIDENT EAGLE AND PHENIX MILLS.

The world belongs to the young. Not only have the youths of today this wonderful inheritance, but coupled with it is the incomparable gift of twentieth century thought—wonderful endowmetns, the earth and its fullness, its possibilities and its opportunities. As from a great central generator the mysterious fluid we call electricity is sent to one machine to produce heat; it goes to another to make brightness and lengthen the day, and give us what we call light; and to still another to feel the pulse and throb of the motor, which carries with it the whir of the spindles and the music, that makes you rich or poor (as the case may be), or as a medium, through which our voices are transmitted to loving friends, or perchance to go through aerial space to carry to ships messages of trade, or of safety for life, or perchance of death—just so into the brains of the young, coming from the Great Giver of Life, comes these wonderful emanations of thought, which by one is transmuted into inventions, by another into paintings, by another into poetry, and last, alas, by some into crime, violence and death. As the genius of America and the world are busying themselves to perfect the measures, through which this mysterious fluid electricity may become more startling in its effects, and more economic in its possibilities; if they can and do busy themselves about this, I say; why should not you and I and every other well-thinking man busy himself about perfecting the brain of the youth, through which this thought must come far in the future ages for expression and for service?

In the life of the youngest manufacturer present there has been seen a growth of the cotton spindles of the South from 561,000 to 12,400,000. He has seen the consumption of cotton in the Sunny South from 189,000 bales grow to 2,300,000 bales. In other words, in this one individual industry, he has seen an increase of 1,000 per cent, and this has occurred in the last thirty years. What is true of this one isolated industry is true of them all. The South has grown ten millions in its population; it has seen with leaps and bounds the products of its mines increase with a rapidity, that has been felt throughout the length and breadth of this country, as well as its agriculture, and everything else, that goes to make a nation great.

If these wonderful changes, that have occurred in the last thirty years, seem great to us, how absolutely insignificant they will become compared to those that will occur through the next quarter of a century—and these coming years belong to the young. What halcyon gift is theirs? They in all reason and hope have forty or fifty years of life, and what shall occur during that half century? Think of the fifty years that have just passed. In that time we have seen all of the greatest progress in invention, that has been made in manufacturing, in mining, in transportation; all of the discoveries that have been made in electricity, either for the transmission of speech, of messages, or power or heat or light, and those numberless things the transmitted power can produce or create. We have seen that most wonderful thing, wireless telegraphy, brought about and perfected; more than that, we have seen opaque bodies made transparent with the radium light, a woman's discovery; we have seen the grave robbed of its victory, in that the loving voices of our friends, who have crossed the river, can be taken from the record, and can speak to us as we knew them ever and anon to cheer us—the mysterious touch of invention has preserved the voices of those, that are no more. All these things that we have seen, and more, we have conquered the air, and all this has been done within the life of the speaker.

And now that we begin to see the mysteries of life and of nature better than ever before; now that scientific surgery has a place all its own; now that a serum gives us immunity from disease; and now that malaria is an obsolete word, and the mosquito bears his own burden of shame, and that the parasite is known to be the origin of pathology; and now that the ravages of the most death-dealing blood disease ever known to man has been stopped at the portals of knowledge; what can we expect of people living in such a progressive age, if within the short space of the last half a cetnury our most iridescent dreams are actual accomplishments?

Education is the foundation of sociology. Originally it was intended for a few people. The monastic theory was, that only those should be educated, who are to deal with the mysteries of the hereafter. The theory of the present is that education best serves its end by dealing with the now. A short time ago the National Association of Manufacturers passed a most caustic resolution, arraigning the educators of America for not introducing industrial education more thoroughly in all the schools, and they were right, because industrial education is that thing, that gives the rich and poor like opportunities, for wherever you find a genius, education brings it out for the enrichment of the community.

This is not an industrial question; it is a question of the life of the industries. More than that, it is a question of the moral tone of the communities for years to come. We should follow nature in educating children; we should take a child, and put him in that channel, in which he is happiest and most liable to succeed. No man, no woman, can ever be happy, unless they are following the bent of their inclination with the hope of having a reward, if they accomplish it properly. The civilized world is experiencing a wonderful revolution. A new science is being born, and that science is called "Industrial Education." Its basis is work; its companion is happiness; and its achievements

*Extracts from an address delivered before the Georgia Cotton Manufacturers' Association.

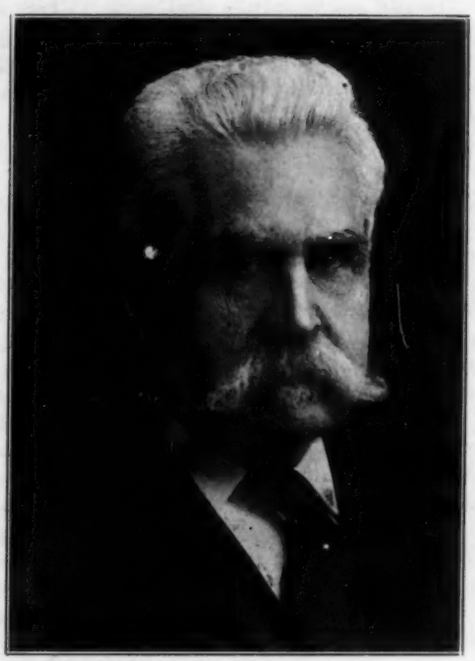
are glory. It is a matter for felicitation that our own state was one of the earliest in the Union to recognize this fact and to welcome the new science, but much is yet to be accomplished, very much, and every farmer, every manufacturer most especially, every banker, and every business man has it as his bounden duty to study this matter, to appreciate its opportunities, and to see to it that it is introduced into the schools, in which he is a factor at home.

The state of Georgia, not in an exaggerated sense, but in a truthful way, is a wonderful, wonderful, state. It is the largest in area of any this side of the Mississippi. It has a climate suited for any and all purposes. It will grow any crop, that is suited to the Temperate Zone; its water powers are wonders; and all it lacks to do what the Lord, that created it, intended it to do—to convert the raw material into the finished product—is for us to embrace the opportunities that lie all around us, to recognize the fact that we represent one of the greatest cotton-growing states in the Union, that we have these wonderful advantages; cheaper and more power, good climate, and all these things —but yet, and above all things, that we should have labor, that is educated, and educated *industrially*.

Industrial education depends upon training and skill, not necessarily the training and skill of the shop and the mill, but upon the foundation taught in industrial schools. Let this practical work in the mills and shops supplement it, and we will have the most efficient people in the world. Only 4 per cent of the wage earners in the United States belong to the professions and to the public service; that leaves 96 per cent who are bread winners. This fact for a long, long time was not appreciated, and the cultural methods that were employed, were all directed to the 4 per cent, ignoring the numerically stronger 96 per cent. Not only numerically stronger, but following vocations very much more necessary for the good of the country and the achieving glory of the people. If we are to raise our industrial efficiency, so as to compete with our neighbors and our rivals, we must do it solely and not only by the individual effort of making each child proficient in the line which he is intended to follow as a vocation in life, and along with that, rest assured if you have any doubts about your child not having culture instilled, that all true culture comes from education, and the truest education in this world is that which cultivates the brain and the nerves and the muscles, all at one time. That leads to the finest culture in this world.

If we are to keep pace with the commerce of the world, there is only one thing left to do. There are three propositions that open themselves to us: we can export from this country our raw material, or we can import educated men and women from abroad, or, better still, we can take our own beloved children, and educate them so that they are as good as Germans, and French, and English. Bavaria, with only six millions of people, has more industrial schools than the United States, with its ninety millions of people. When we are flattering ourselves in our American grandeur of accomplishment, we ought to sit down in sack-cloth and ashes, and hold secret penitent communion with ourselves, and see if we should not hang our heads in sorrow and shame.

There is no room in America for the idler. There is no excuse for any man, no matter how wealthy he is, or thinks he may be, to ignore plain straight manual labor. The time was when they thought that a man was ignorant and unsophisticated, if he didn't know how to read and write; the time will come, when you will say that that man, or that woman, who cannot *do* things, is ignorant. That time *has* come when idleness and not work is looked upon by the better element of Americans as a disgrace to a man; and so, like a mighty wave, all over this country, the tide of industrial education is spreading, and state after state has adopted it, municipality after municipality are investigating it, and through the efforts of the National Industrial Association our campaign of information has spread over the United States until our ignorance is now very small, compared to what it was only a few years ago, and it is comforting to us, without being vainglorious on the subject, to say that the state of Georgia, known almost all over the United States and abroad as an agricultural state, can boast of a school of technology, which has graduated many young men, armed for the battle of industrial life. It can boast of a normal industrial school located at Milledgeville, whose dormitories are filled wth women, who dare to earn their own



HON. G. GUNBY JORDAN

living and be proud of the fact. It can boast of at least one town in this state, starting with the free kindergarten for black and white alike, has manual training in all of its graded schools, and winds up with an industrial school, that teaches them textile work, foundry work, machinery work, dress making, millinery, biological work and chemistry, and anything else, that will help make an honest living, and, when they have served their apprenticeship, after three years, they can step out with a diploma, and command a place at $2.00 or $3.00 a day the first day out of school. More than all that, the state of Georgia has in each Congressional District an Agricultural and Mechanical School, which are naturally the pride of every citizen of those districts, and they are doing noble work. They are teaching farmers' girls how to run a dairy; they are teaching them how to sew; they are teaching them how to cook; and they are teaching the boys the improved and best methods of agriculture; and so you can see the footprints of this wonderful impetus in every district in the state of Georgia.

And what is the result? Mechanically, agriculturally,

industrially, we are marching on. It is a matter for felicitation to know that the Southern states taxable values in lands for agriculture today stand at the head of the United States, having displaced Illinois for that place. It is a matter of great felicitation to know that the state of Georgia has jumped from 14th to 4th place, and shows a taxable value increase of 188 per cent in the past decade, not better than some other Southern states, but better than all of them; and this has been accomplished very largely by the fact of the schools in the state of Georgia. Let's recognize it, and let's back them, and let's see that their usefulness is extended.

Speed Moseley, state pardon attorney of Missouri, says that two-thirds of all the prisoners in his state, and he believes in many other states, are men who never had any kind of vocation, and he says in addressing the warden of one of these large penitentiaries in reference to a batch of prisoners that were lined up, he asked, "What will you put these men to doing? What vocation are they all engaged in?" The warden replied: "They have no vocation; if they had, they would not be here." And so, if we look at this thing either from a moral or a religious standpoint, there is a bounden duty, that we have got to perform for the people that are young and dependent upon the older ones to do their thinking for them.

Industrial education is intended to, and does, prepare men and women for the different walks in life; it prepares them for business and for contentment; it prepares them to earn a living, and to do it in an elegant, efficient, beneficient, and satisfactory way. That is what industrial education is for. But outside of all the things I have named in material things, the greatest thing that possibly could be accomplished by industrial education, would be the saving of what we now call "waste matter" in the South. The truth of the matter is that we are allowing, and have allowed for ages, some of the most wonderful things, that lay all around us, to go to waste, and have not used them because we were ignorant, plainly ignorant. Take Ducktown in Tennessee, for example. There were a lot of people there with their copper ores, following the old death-dealing plan of roasting the ore out in the open, sending off fumes, the consequence of which was the killing of vegetation in all those North Georgia counties, and they were indignant against them. What did they do? They sent over to Germany to get people to tell them what to do. It is a pity, that we have got to go to Germany for all our brains about things of this kind, but it's a fact, all the same—and especially for educated experience in that line. So the Germans came, and told them of their death-dealing method, and they said, "It is all wrong, and more than that, you are passing out and away from you all the time the most valuable part of your product, and you ought to save it for sulphuric acid." Instead of killing vegetation and ruining everybody, they are today turning what they thought was a waste product into sulphuric acid, and this is due to the technically-educated German.

That induces me to talk a little about Germany. In 1816, when Napoleon had conquered Germany, and his conquest and victory was absolute, the wise men of Germany got together and had a meeting. They said, "What shall we do?" and the brave and more sensible ones said: "Friends, there is only one thing we can do, and that is to educate our people," and every one of us can bear testimony to how thoroughly they carried out that resolution. So in 1870, when the victorious army of Germany marched into France, the statistics show that 97 per cent of the Germans could read and write, and barely 15 per cent of the French, and, while it may be or may not be true that the wonderful results of that short campaign were attributable to education, we do know that education played no small part in it, and that France took the lesson to her heart, and so she has in the last few years divorced church and state, and the state is today educating the Frenchman just on these identical lines.

Today the German mechanic is the best workman in the world; in fact, he is the most intelligent, because his education is directed in solid direct force right at the vocation he is to follow in life, and, when he quits his schools, he knows absolutely, thoroughly, everything pertaining to it. What is the result? Take South America, take the Orient, or anywhere, and where Germany has started she has made inroads on the trade of the balance of the world. That reminds me of a little personal experience. I was in Mexico a little while back, and I heard this story, and verified it by the American consul. A German again—I regret to have to appeal to Germany so often for illustration, but it is so manifestly a fact about Germany—a German went down there, sent on a commission by his people from Germany to attend the erection of some machinery, and while he was there, he noticed that the children would chew a little plant, and when they had chewed it up, they would make little balls of it. He had gotten together several of these, tested them, looked at them, and wondered what they were, and how they could be used. He asked how long had this plant been growing there, and he found out that it was known there clear back to the Aztecs, away back before the days of the Spaniards. You know Emerson says that the weed is a plant we do not yet know the use of. So this man says to himself, "I will find out a use for this, and take this plant out of the weed class," and he hied himself to New York, and our people with that conservatism, which often sleeps over golden opportunities, saw nothing in it. So he got passage on the first German Lloyd steamer to the "fatherland," and upon exhibiting this plant, he was asked, "What is this?" "Why, it is rubber." "Where did you get it?" "In Mexico." This man comes back with a good financial man, and last year the export of rubber from Mexico was $31,000,000. On some lands in Texas they are producing the same plant, from which rubber is made, and which is grown extensively in Mexico, but we had to get a German to show us what its use was, and that's due to German industrial education.

Just a few more illustrations. Take mushrooms—the mushrooms in America, if we were not ignorant, if we knew an edible mushroom from a poisonous one, would yield a crop in dollars and cents bigger than the wheat crop. One state has recognized it. Minnesota has done what Europe has done years ago. Saxony has a mushroom plant, that teaches their people, and tells them just what is what, and France does the same thing. It has teachers and lecturers on it. Minnesota has issued a pamphlet, and gives ten to every school, and one to anybody, that will write for it, and it gives the pictures in their exact colors of all edible mushrooms in that state. In the South we have them laying around us loose, as the opportunities always have, and ignorantly we say they are "toad-stools," and let them go, and we go to the shops, and buy the beautifully-canned goods with an elegantly-colored label or brand on it, put up *in France.*

Now let's go down to the manufactures—something we

can put our hands on. Sir Titus was in Europe and he noticed great piles of hairy wadding being sold off for waste. He took it, and went to work on it, saw to it that it was properly treated, and Sir Titus, a Frenchman, was the man who gave alpaca its reputation.

Again, in the soap factories of London they found there a viscid product on top of the soap as it boiled, and they would skim it off and throw it away, and they would keep that up until it would clarify. A man, passing there once, who had a technical industrial education, said, "You are wasting thousands of tons of glycerine every year." "Let's save that and get rich." The same way with glucose in this country. They had been making it in Germany for years and years, and when some poor little German came here and began to produce it, those fellows out West there thought that it was a great secret, and that nobody in the world knew it but him, and they insured his life for $100,000. That is the foundation of the corn products, and the syrup that makes battercakes good. It all came from the German mind.

Take coal-tar. The gas-works in any city thought they were very fortunate, when they were located on a running stream, where they could empty out their tar, and let it go into the river and destroy the fish, the poor man's pig. A man technically trained noted the beautiful prismatic colors as this tar went down the stream, and now all the aniline dyes used by every colored mill in America come from this product. More than that, they found that in this coal-tar was the element to make smokeless powder, and the military use it more than they ever did.

We have produced many things synthetic, but we have never yet produced synthetic bread, and up to date very little synthetic cotton. So it is absolutely necessary to have something to restore to the soil the elements taken out of it by plant life, especially the phosphate, the potash, and the nitrogen. We have to depend largely on Chile for nitrate of soda. Nitrate of soda has made Chile rich, but in the course of 40 or 50 years its nitrate of soda beds will be exhausted, and something will have to take its place. The Germans saw that long ago, and they were using a vast amount of it from Chile and America more of it. So they said, "What's the use? Let's make some nitrate of our own," and they have gone to Scandinavia and to Italy, and have put in electrical machinery, and they are extracting it right out of the air, and making a lime sulphate of nitrogen in a better shape for agriculture than the nitrate of soda we got from Chile—and that is another one of the achievements of technically-trained men.

I could give you innumerable instances of where things were utilized that were presumed to be absolute waste, but I will desist. Sir Al Moseley a short time ago sent Doleman's celebrated picture of "Am I My Brother's Keeper" over to New York, and presented it to the Board of Education. Ex-President Theodore Roosevelt was chosen to make the presentation, and it impressed me very much. The picture represents three or four derelict human beings, who are seated on a bench in the park with the snow falling on them. They huddle together to try to keep warm, so that the natural heat in all their bodies would assist in keeping out the cold. These men in all probability had a classical education, certainly an academic one, but their parents or their board of education forgot to teach them an industrial occupation, and there they sat, with the cold beating in their faces, and their hearts chilled. "Am I my brother's keeper?" Yes, my friends, we are our brothers' keepers, and no man can draw himself within the shell of self-satisfaction, and say, "I am a sober man; I support my family; I contribute to the church; I have discharged my duty." Poor man! Poor fool, who imagines that that is all of life! All around us; all about us, are men, who are not endowed with equal opportunities, children, who by nature and tendency might become useful men and women, but who, by environment and consequent neglect, will become criminals if allowed to go on the pathway they have started. We are our brothers' keepers. Take it to your heart, and resolve that from now on you will strive to see to it that those around you have something that they can lay their hands to, and keep them from contemplating the silent stiletto to take away a life that has no pleasures.

Believing that, the Board of Trustees of the Public Schools of Columbus, Georgia, recognizing the fact that they were their brothers' keepers, have introduced into that city (and it enjoys the distinction of being the first municipality in the United States to do it), a system of schools, which starts with a free kindergarten, that teaches the blacks and the whites how to use their hands; how to make a negro girl a good washerwoman; how to make a good ironer; how to make a good cook; teach the boys how to be a good mechanic, a good carpenter, and, if need be, a good blacksmith; and we are going to introduce leather work along with it. We teach every white girl how she can equip herself as a milliner, a dressmaker, a good cook, and for the boys and girls we have an absolutely complete textile factory and a knitting mill from the beginning to the finished product. We teach these girls at commencement, instead of getting up there with their hair tied up in blue ribbon and reading a beautiful little essay about "how we will now go out into the wide, wide world" (such as we have been inflicted with for years), to get up there on the stage and have a gas stove in sight, and one of them walks to a table, and makes up cakes to cook in that gas stove; another one comes out, and takes the measure of a girl for a dress, and they all work right there in sight, and they make a dress, which the girl wears out into the audience and serves the cakes, that have been baked in that gas stove before your eyes. That is true education. That's knowing how to live and living, and that is what Columbus, Ga., is doing.

Yesterday we had some real learned discussions from some of the most experienced and eloquent men in our association as to what was the matter with our labor. What we really want is to pay the labor more, also to get more out of them. Labor is a fluid substance; it goes where it pleases; it is going to take care of itself. Treat them right for your conscience' sake, but the main thing to do is to educate them. That's what you want. You want a man or woman who goes into your mill, to know red from brown. Teach them that money is a wonderful thing, and they ought to accumulate some of it. Educate them and pay them sufficiently, and you will get the results you want, but the great trouble in America is that, due to our superficial methods, we have had to depend upon Europe for brain and brawn, when we ought to produce both right here. All of this ought to be done, and we must do it.

I want to terminate this talk by simply saying that I hope that somewhere in these desultory remarks I have said something that will touch a responsive chord in the hearts of you men of influence, for every manufacturer is a man of influence; his own people respect and honor him, and his community recognizes him as a man worth while, or he would not hold the position he does. Let each man say to

himself that I will see to this in my own community; I will start a campaign and an agitation and a discussion of the question of educating my own boys and girls, and my employes' boys and girls, so that in the future we in the South will all be absolutely independent of Europe and the East. This done, we can draw from our own boys and girls, the brains and the skilled help, that we now have to import. Let each man do this, and let him continue to do it, and say to himself, "Then on, then on, where duty leads, my course shall be onward."

SYSTEM AND COST IN THE REPAIR SHOP.

BY RICHARD THIRSK, MASTER MECHANIC, INDIAN HEAD MILLS OF ALABAMA.

Manufacturing methods in the mill repair shop are something of a novelty in this section. That it is a satisfactory arrangement if correctly carried out is my belief, and most repair shops of fair size will find it a profitable investment. Of course it calls for a somewhat larger investment in tools than is usually found in repair shops, but that is a minor consideration compared with the benefits to be derived. There are many jobs that come to the repair shop that must be handled in the usual repair shop style; there are also many jobs that may be profitably handled under manufacturing methods that will show a large margin of profit over the old methods. As a rule all repair parts especially for looms may be made up in sufficient quantities to justify the expense of making jigs thus insuring interchangeability and low cost of manufacture.

Take, for example, a job handled a short time ago, an order came into the shop for 90 draft gears of 40 teeth 24 pitch, these gears were 2 1-12 inches outside diameter ⅞ inches face and with 21-32 inch taper hole. The banks were chucked in a universal chuck in a 16-inch turret lathe. The first operation was to drill the 21-32-inch hole; the next to face off one side which was done with a tool in the cross slide; third, the hole was reamed with a taper reamer, a collar on the reamer determining the diameter of the hole, the blanks were next key-seated, a 5-32-inch hole being drilled through the blank and then drifted out with a square tool; a hardened steel plug with a key was used to finish the blanks, the blanks pushed onto the plug, and two cuts taken over the face with roughing and finishing tools held in the turret, thus sizing the blanks without calipering. A cut was next taken across the unfinished side making the width ⅞ inch and completing the blank ready for cutting teeth. The teeth were cut on a Whiten hand-feed gear cutter, the machine being operated by a boy at 75 cents per day. The 90 gears were completed in 9 hours actual time including setting the tools, and the cost figures as follows:

9 hours for a man at 20 cents, $1.80; 9 hours for boy at 7½ cents, 68 cents. The blanks weighed 88 pounds, at 3½ cents a pound, amounted to $3.08, or a total of $5.56 for the 90 gears. The usual cost of these gears from the maker is 48 cents each, making a total cost of $43.20 less $5.56, showing a saving of $37.64 on this job.

If these gears had been made by the usual method; that is, drilling the hole and reaming by hand; then driving them on a mandrel and finishing in an engine lathe, calipering to size both diameter and face, it would have taken at least three days, not only showing a greater cost, but also a longer time before they could be put to use.

The writer has for several years been making all repair parts for 800 looms, employing this method, and finds that the cost averages a little over 35 per cent less than the same parts purchased from the loom makers. The average number of pieces used is 160 per week and the average weekly cost is $17.19, or .0214 cets per week per loom. When purchasing repair parts from the loom makers, using the same amount of pieces, the average cost per week was $23.20 per week, or a difference of $6.00 per week. All parts are made in quantities just as they would be if made for sale. They are placed in stock and given out as required, and charged against the section using them, a weekly report is made up showing the number of parts used on each section and cost of same. One copy goes on file in the office and another copy is given to the overseer enabling him to get a line on his repair cost, and incidentally showing him who is the most efficient section hand.

It should be the aim of the up-to-date mechanics to anticipate the needs of the mill and as far as possible keep repair parts on hand for all needed repairs. I am aware that in a mill of fair size it would preclude the fact of the master mechanic working, as is the custom in some places, but given the right type of man more can be accomplished by keeping the hands at work than by doing manual labor himself, the old saying exemplifies this, "The eye of the master can do more than both of his hands." I can look back some fourteen years, when I arrived at a mill that had been running some six months to take the place of master mechanic. I found a very well fitted up machine shop, with good modern tools, some of which had never been belted up. There was one man and a boy in the shop, the man was turning some let-off studs for looms, a piece ¾ of an inch in diameter and 7½ inches long made from ⅞-inch stock, there being four different diameters on each piece and one end threaded for a nut. The workman was making them in the old-fashioned way, cutting off each piece to length, centering and turning them in an engine lathe, calipering each diameter and measuring each length, he said proudly that he was making ten each day. Among the tools was a pretty fair 16-inch turret lathe, not belted up or fitted with any tools. After getting this lathe fitted up, this stud job was put on this machine and after the tools were set, 70 to 75 of these studs were made in a day by the same workman that had been making ten per day, reducing the labor cost on this item from 20 cents to .028 cents each. As there were about 1,200 of these studs used yearly this one item alone showed a saving of over $206, and this piece was only one of about 180 pieces per week that was used in this mill.

I have in mind now a mill running about 850 modern looms that is paying out over $3,000 per year for repair parts on these looms. Just compare this sum with the 800 loom mill previously cited that is making all of their loom repairs for approximately $1,000 per year, a difference of $2,000 on looms alone. More than enough to cancel the master mechanic's wages.

Now, a few words in reference to the qualifications of the master mechanic in a modern mill. In the first place he should be a thoroughly practical mechanic able to perform any job that comes to the shop and to do so quickly and well. Not, necessarily, that he should *have* to do so, but to enable him to see that his men were using the best methods and to correct them if found doing otherwise.

*Read before the Southern Textile Association.

I have come across some cases where the master mechanic was a mere figure head and had to rely entirely upon the skill and judgment of his subordinates. Happily, this class of men are rapidly becoming obsolete. He should have a good knowledge of steam engineering, both in practice and theory; and also a good working knowledge of electricity; so that it matters not what power is used, his knowledge would be equal to the occasion. All shafting, main belts and other apparatus used should be periodically inspected to guard as far as possible, against a shut-down during working hours. Of course there will be accidents and stoppages that every precaution will not eliminate, but a great many may be avoided by a good system of inspection and as a matter of fact he should aim to be a preventer of repairs rather than a repair maker.

Just a few words on the question of supplies, in a small mill. This may very well be handled by the superintendent, but in the larger mills the supplies should be under the jurisdiction of the master mechanic. The writer has had the purchasing and distributing of supplies for the past eight years, and has adopted the following system: A supply room, 32 x 48 feet has been fitted up over the machine shop, and is in charge of a competent man who is on duty all day to give out supplies. The card index system is used, there being a card for every article used. On this card is entered the date of receipt of goods together with invoice price and cost per piece. On the same card is entered from time to time the amount given out, the party or department receiving them and the cost of same. These cards are footed up every month and a monthly statement made out for the office showing amount of supplies received, amount given out, to whom given and cost of same. The supplies on hand are carried forward to another card to be used the following month. It is a very simple matter to ascertain in a few minutes just what supplies are on hand, how much has been used and the cost at any time. Our supply room inventories about $5,000 and contains about every thing used in a textile plant. Under the system, or rather lack of system, that was in vogue prior to the one now in use, each overseer had a supply room and ordered his own supplies, and in many cases there were plenty of supplies on hand in some rooms, whilst others were in need, but could not get them as they were being charged against the room ordering them and the overseer who had charge of the supplies would not let another room have any. With this system in use now, there is no need for an overseer to have a supply room, and as one man handles all the supplies, there is never a lack of supplies on hand.

According to advices from Tokio, quite a boom is being enjoyed by the cotton spinning industry in Japan consequent on the increased trade with China. Not only have eleven new companies been recently formed, but many of the existing mills are being enlarged. The Japan weekly mail states that the number of spindles to be installed by the new companies is 208,000, and that no fewer than 279,200 are to be added to the existing mills. It is farther reported that the Chinese demand is steadily changing from the coarser to the finer qualities of yarn.

The increase in the total cost of materials in the knit goods mills of the United States for the year 1909 over the year 1899 was 115.3 per cent, while the increase in the total value of the manufactured products was 108.8 per cent.

"IS AN OVERPRODUCTION OF COTTON POSSIBLE?"

BY THEODORE H. PRICE, IN COTTON AND FINANCE.

After an absence of nearly four months from New York, most of which time has been spent in the cotton fields, I am constrained to record my impressions of the industrial and economic situation in the agricultural South.

The cotton states are prosperous to a degree never before equalled in their history. The money to finance sound economic development in the South is today more easily obtainable than it has ever been.

The only restriction upon enterprise is the scarcity of labor. Of the enormous immigration into the United States during the past 20 or 30 years, a negligible portion only has gone into the Cotton States. Meantime the more intelligent of the negro population have been drafted in increasing numbers to build and operate the railways, factories, mines, lumber mills, power plants and public utilities that have multiplied so rapidly.

The growth of the urban population in the South has been far more rapid than the growth of the rural population, but the statistics do not tell the whole story in this respect. In the South, as elsewhere in America, nearly every one wants to enjoy the comfort and luxury of city life, but it is only the more efficient and intelligent portion of the population who are able to gratify this aspiration. They go and those who are left on the farm are mainly the lazy and ignorant residuum of the negro labor.

Wherever I went I heard the white land owners complaining of the increasing "worthlessness of the nigger." It is not perceived that the intelligent and industrious negro is leaving the farm so that the average efficiency of the constantly smaller number who remain, is being annually reduced.

Large employers of labor in the South tell me that they find it impossible to attract and retain any of the immigration now coming into America from Europe. Prohibition against the sale of alcoholic beverages, now general throughout the South, is one of the less important reasons why European laborers won't stay there, but mainly the climate and the negro keep them away. It will be a generation or longer before the attractions of "country life," for the wage-earner will be such as to overcome the "lure of the city," and until that time it seems almost certain that any increase in cotton production can only come through:

(1) The introduction of labor-saving machinery, which will be slow, or,

(2) Intensive cultivation, which will be equally slow, or,

(3) The displacement of other crops which will only be accomplished when the price of cotton shall remain permanently at a figure which guarantees a larger profit than corn, cattle, peanuts, rice, sugar cane, potatoes or garden truck, which are the principal products with which cotton has to complete in the various portions of the South.

I have no hesitation in saying that at the present high prices for these food products, there is more profit in raising any one of them than there is in cotton sold for twelve cents a pound, at or below which price it seems to me the production of cotton is automatically and economically limited.

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Meantime the world is consuming at least 1,200,000 bales of American cotton each month, or 14,400,000 bales annually. There is no prospect of any serious decrease. An increase of even 10 per cent in the crop for any one year provides a surplus equal to only about one month's consumption. When the contingencies to which the cotton crop are exposed from year to year are considered, is it likely that a surplus of one or even two months' supply will exert a permanently depressing influence on prices?

The vagaries of the future markets in New York and Liverpool exert a daily more remote influence upon the price of spot cotton in the South.

I have seen it selling for 12 cents in the country when futures were quoted at 10.75 in New York and it is selling for 12¼ when futures are 11.75.

Insofar as the price of cotton is concerned, the South governs itself and is no longer governed by the future market.

It is for this reason that I depart somewhat from the usual editorial policy of *Cotton and Finance* in calling the attention of spinners and investors to the fact that contracts for the delivery of cotton in Liverpool during July-August, 1914, can at time of writing be bought at prices substantially below those ruling for immediate delivery. Quotations for such contracts at the close of the Liverpool market for the previous Thursday can be found on another page, where they have for some time past been published.

The buyer of such contracts, assuming that he has need for the cotton during 1914, protects himself against the contingencies of the next twenty months at a less price than he could today, and escapes, moveover, the storage, interest and insurance in the interval.

For twenty months these charges aggregate nearly 20 per cent.

It is one of the paradoxes of future speculation that such an opportunity should exist and it is not in my opinion likely long to continue.

TRADE-MARK REGISTRATION

BY J. NOTA M'GILL, LECTURER ON PATENT LAW AT GEORGETOWN UNIVERSITY.

The trade-mark Act of 1905 differed from that of 1881 in two important particulars: First, in providing for the registration of marks used on goods in interstate commerce, as well as in commerce with foreign nations and Indian tribes, and, secondly, in reducing the fee from twenty-five dollars to ten dollars.

Doubtless to these changes in the law is due the large increase in the number of registrations. In the first seven years of operation under this act, 42,945 certificates were issued. This is but 1,413 short of the total registrations in the preceding thirty-five years under the Acts of 1870 and 1881, and 6,777 greater than the registrations granted in twenty-four years under the Act of 1881. In other words, under the Act of 1870—the first federal trade-mark registration law—8,190 certificates were issued; under the Act of 1881, 36,168, and under the Act of 1905, 42,945. In the first seven years under the present law there were nearly 65,000 applications for registration; 1,200 oppositions and 218 cancellation proceedings, representing in round figures nearly seven hundred thousand dollars paid to the government by owners of trade-marks.

Oppositions are fomented by the activities of certain agencies by which all marks laid out for publication are closely scanned and notices sent to all who might by any possibility, however remote, be led to apprehend possible conflict, or recognize a plausible ground for a contest. It is not uncommon, in consequence, for the owner of a mark used unmolested for many years, and in the exploitation of which thousands of dollars have been expended, to find himself confronted by another, often from a remote region, and until the present time each ignorant of the use by the other, or at least with no thought of a conflict until prompted to the belief that a contest may prove remunerative. It is not possible to estimate the expense of defending opposition proceedings, or the amount paid to buy off conflicting interests.

While opposition proceedings impose a heavy burden, the latter is small in comparison with the number and variety of interferences, involving, in most cases, a large expenditure of time and money in taking proofs to establish or defend one's title. These interference cases are especially vexatious, frequently embracing marks having but little in common either as to symbol or classes of goods. Owners of marks long registered are forced to defend their title even when all the parties to the cause are agreed that there is no actual conflict, either in the marks or the goods to which the respective marks are applied. They are powerless to terminate the proceedings without a concession or judgment.

But a matter of still greater moment is the existing practice of considering all marks and rejecting them on technical grounds, often on the theory that if a single feature of the mark has been previously used it is not entitled to registration. Adverse rulings invite encroachment, materially impairing the value of the mark upon which frequently a large and profitable business may depend. The rejections are more frequent than otherwise and on grounds which would have no weight were they raised in opposing a suit for infringement.

It is not believed that the Congress ever intended to make it difficult to obtain registration. The public interests do not require that it should be. The public parts with nothing; it gives to the owner of the trade-mark practically nothing he did not already possess. The value of the mark as such remains the same whether it be registered or not.

And after contemplating the risk that is run and the expenditure incurred by owners of trade-marks in seeking, obtaining, opposing and defending registrations, the question arises: What advantages ensue from registration? Wherein are the interests of owners better conserved than if they had not registered? What right have they been able to enforce after registering that could not be recognized before?

The only instance in which registration may be truly essential is where registration abroad is a necessity and registration here is a condition precedent to foreign registration. Aside from this, the only advantage flowing from registering is the creation of a public record tending to show time of adoption and use.

It is true that by registering suits may be brought in the federal courts against infringers in the state where the owner is domiciled. But is this a substantial advantage? Are not the state courts equally qualified to mete out justice

*Read before the American Bar Association, at Milwaukee, Wis.

and to decide questions involving conflicting marks? It is also true that there is a certain moral advantage, if I may use that term, since it is claimed that greater respect is accorded a mark registered by the federal government.

But granting that this also is a substantial advantage, as well as that of creating a public record of ownership, could not the same end be accomplished by a law less complicated and the administration of which would be freed from the highly technical, frequently absurd, method of treating applications for registration? If the law allowed the owners of marks to obtain registration by simply lodging properly prepared applications—abolishing opposition and interference proceedings—the public interests would be equally as well conserved as they are now, and this without imposing upon manufacturers the great expense now being incurred, and at the same time free the government officials and the Court of Appeals from ruling on matters frequently of no public importance and settling no proposition of law of any value as precedents save on ministerial questions. All this could be avoided and money saved by allowing registration to all comers, leaving the question of validity to the courts to decide should the occasion arise. Not only will owners of trade-marks be saved a large proportion of the money now expended, but they will be spared the possibility of injury arising from adverse rulings as to title and legality of marks. If this were done the registration of trade-marks might with propriety be assigned to the Department of Commerce and Labor to which it logically belongs.

PACKING AND MARKETING COTTON.

For many years there has been criticism of the condition in which American cotton reaches foreign markets, and although many efforts have been made to effect the needed changes in the methods of handling it, comparatively little has been accomplished. In a report on the packing and marketing of cotton, just issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce and Labor, Commercial Agent John M. Carson describes the present system and offers certain suggestions for its improvement. The wastefulness of the method now in vogue is recognized by everyone connected with the industry, but because of the many factors involved and the conditions under which cotton is produced in this country, the formulation of any plan for their improvement is very difficult. For this reason the suggestions by Mr. Carson are presented, not as a solution of the problem, but as a basis for further discussion by the commercial interests involved.

The two features to which Mr. Carson calls particular attention are compression and grading at the gin. As to the former it is stated that gin compression is practicable for the large proportion of the cotton crop that is grown under conditions of concentrated production. Grading at the gin is suggested, with the statement that its feasibility is open to question.

The report is devoted in part to a description of present methods of handling cotton, from farm to mill. It is shown that adherence to antiquated methods greatly increases the cost of marketing and results in a loss estimated as high as $50,000,000 annually through damages incidental to insufficient and inadequate covering, increased cost of transportation, insurance, warehousing and handling, etc. In the calendar year, 1911, cotton contributed $517,000,000 to the value of our foreign trade, to which should be added $42,000,000 for cotton seed products, in consideration of which the report states:

"A commodity of such enormous value to the industries of the country and of such paramount importance in the maintenance of the national credit in the settlement of international balances surely should be nurtured and handled and safeguarded in consideration of its great merit and value, and in accordance with the advanced methods that insure increased efficiency in production and the fullest measure of economy in the preparation and conveyance of products to market. Cotton is the only important commodity which has resisted the progress of the age and which continues to enter the market places in the form and garb of days prior to the Civil War."

It is stated that compression at the gin, where practicable, would save a large proportion of the expense that attaches to present methods. The value of gin compression compared with other methods in the matter of space is shown by the fact that while 50 to 55 bales fill a 34-foot box car, 85 to 90 gin-compressed bales may be carried in the same space. In the case of the flat or plantation bale, which must be transported from the ginnery to the at times distant compress, only 25 bales can be carried in a 34-foot box car. When it is known that upward of 40,000 cars are required to carry the cotton crop the value of gin compression, in the matter of transportation alone, will be appreciated.

Other features treated more or less in detail are the pulling of samples, cost of transportation, baling materials and methods, country damage, and warehouse facilities.

In connection with the suggestion as to the grading at the gin the present method of grading is described, and figures are given to show the value of different grades according to the classification adopted by the New York Cotton Exchange for the year ending September, 1912.

Reference is made to the work now being done for the cotton industry by the government, especially the agricultural department, and much information is furnished that will prove helpful in the consideration and study of measures looking to the desired reforms.

The publication, together with the report on Cotton Tare issued by the Bureau of Corporations and the series of consular reports on the same subject issued as House Document No. 577, Sixty-second Congress, second session, presents exhaustive information on the subject and furnishes the basis for intelligent and practical action on the part of those interested in the cotton industry and trade.

ERRATA.

The article entitled "A Study on the Cost of Power," which appeared on page 4 of the November issue as contributed exclusively to COTTON was, through some misunderstanding, also allowed to appear in other publications, therefore, COTTON'S claim of exclusive publication is invalid. This explanation is given to show our many readers that the error was involuntary.

An American consular officer in a European country reports that a business man in his district desires to import large quantities of cotton waste and would like to get in touch with firms in the United States handling this product. In writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., refer to No. 9553.

Mill Conditions and Market Reviews.

SOUTHERN MILL SITUATION.

(Special Correspondence).

The most important event of the past month has been the election of a Democratic president of the United States, a man who is an out-spoken free-trader, and one who will put his theories into practice as fast as he finds that they are suitable to the needs of the country. Mr. Wilson has made the statement that many schedules need revision downward, steadily downward, and the cotton bill is among the first on the waiting list to be considered when the extraordinary session of Congress convenes, which will probably be in April, 1913. The American Cotton Manufacturers' Association is to hold its next meeting at Washington during April for the express purpose of getting in all of the work possible by that body against any unnecessary revision of the cotton schedule. This association has done a great deal during the past two years on the matter of tariff and its meeting at Washington at the time the cotton bill is being considered by Congress will bring to bear on Congress all of the tariff education of the South.

The South is not stiff-backed against any revision whatever of the tariff on cotton goods, as it is recognized by many manufacturers who have made a close study of the situation, that there are some schedules of that tariff which might be lowered without any ill effect on the trade. No trepidation is felt among the manufacturers that the cotton manufacturing industry of the South is going to be injured by having at the head of the government a Democratic free-trader, and business is growing and has grown during the campaign that has just closed in a way that has never been duplicated in any previous election year.

Markets are still strong and show no signs of a break. The knit goods market has shown some slight irregularities at times during the two weeks just previous, but this has been more because of undercutting between sellers than caused by any uneasiness on the part of the manufacturers, who have the situation well in hand. The stocks on hand are small and there is no relief for the buyer who must find his requirements regardless of prices. Knit goods manufacturers are well sold up, in some instances for two or three months ahead and they are not in many cases willing to accept orders at anything that does not suit their taste as to a showing of good profit.

The yarn market is probably the strongest seen for many years at this time, as weavers and knitters seem to be completely out of stock and many of them are on the market taking what they can find in a hand to mouth manner rather than meet the high prices demanded by spinners. Prices are not unreasonable, however, and with cotton up and no prospect at present of a slump there is not likely to be any lower prices named on cotton yarns by the manufacturers. Even when buyers are willing to come to the prices asked it is often hard to get the deliveries wanted as most of the mills are unable to promise any deliveries promptly.

Prices on cotton goods are also firm. Mills and selling agents have moved up prices on staple brown goods and buyers in need of goods have discovered that the mills are well under contract for the near forward months. Orders are plentiful and these are not now what the manufacturer is most interested in, but where and how can he produce the goods to meet the demand that continues to come forward.

Many of the mills are on night work, and others which have never adopted this system before are doing so in order to take care of the orders that can be obtained. Necessarily this has brought about serious trouble in some parts of the South in regard to the help, and many sections are unable to get all of the help they need to run their mills.

As stated above, cotton has continued to advance and is showing no signs of weakening, regardless of the fact that the farmers are pretty generally marketing it as fast as they can have it ginned. The last ginners report, issued recently, showing the ginnings up to and including November 1, showed that 8,849,898 bales of this year's crop had been ginned. Cotton consumption for October was 511,285 bales, while there was on hand October 31 2,743,210 bales. There have been a number of estimates on the size of the present cotton crop, but one of the most reliable is that of R. A. Lee, of Charlotte, who estimated the crop at 13,649,000 bales.

A matter of interest to manufacturers generally was the reorganization of the Saco-Pettee Co. in the Saco-Lowell shops by the purchase of the Pettee interests in the former company by the Lowell Machine Shops, of Lowell, Mass Both companies are well known in the South.

A resume of the month's progress in mill building, etc., will be of interest. There has been less done during the past four weeks than has been accomplished during any similar period in the South for some time; which is ascribed merely to the idiosyncracies of natural events.

New Mills: Meredith Hosiery Mills have been incorporated at Salisbury, N. C., to operate a small knitting mill. A new $250,000 mill is proposed at Lilesville, N. C. American Tape Co., Atlanta, Ga., incorporated at $50,000. A new mill is proposed at Alachua, Fla.

Reorganizations: Eagle Cordage Co., Covington, Ky., incorporated at $50,000, to take over and operate the mill recently sold and known as Overman & Schroeder. South Atlantic Waste Co., Charlotte, N. C., is now under the management of Crefeld Waste & Batting Co. Cherokee Hosiery Mills, a reorganization of the Rome Hosiery Mills and Cherokee Hosiery Mills, which have been combined; capitalized at $60,000. York Cotton Mills, Yorkville, S. C., have been placed in involuntary bankruptcy. Cherokee Mills, Griffin, Ga., have been sold to J. K. Ottley and associates for $77,000.

Additions and Improvements: Glencoe Mills, Columbia, S. C., are adding 100 spindles. Hannah-Pickett Mills, Rockingham, N. C., will add about 300 spindles. Sellers Hosiery Mills, Burlington, N. C., are adding equipment that will about double capacity of plant. Westervelt Mills, Greenville, S. C., have increased capital from $1,000,000 to $1,250,000. Abbeville, (S. C.), mills, according to authentic report, will add 25,000 spindles. Patterson Mills, China Grove, N. C., are replacing 158 old looms with 170 new, latest improved looms. Exposition Mills, Atlanta, Ga., are making a further addition of humidifiers. Long Island (N. C.) mills have repaired their water-wheel equipment and have installed one new wheel. Monarch Mills,

Dallas, N. C., are installing a full equipment of twisters to twist their entire product hereafter. Sanford (N. C.) cotton mills have contracted for new machinery at a cost of $15,000, for the carding and spinning department. King Cotton Mill Corporation, Burlington, N. C., are adding new machinery and other improvements. Salisbury, (N. C.) Cotton Mills are adding new machinery and buildings at a cost of $12,200. The Hetrick Hosiery Mills, Walhalla, S. C., are adding a sprinkler system. Pickens, (S. C.) Cotton Mills are adding 160 looms. Dacotah Mills, Lexington, N. C., will add 4,800 spindles and 200 looms next year. Marion (N. C.) Manufacturing Company, is installing new engine and boilers in power department. Jackson Mills, Iva, S. C., are building new warehouse and installing suction system. Paola Mills, Statesville, N. C., are building new building and installing 5,000 additional spindles.

Williamsburg, (Va.) Knitting Mills have been shut down indefinitely. Kershaw, (N. C.) Cotton Mills have let all contracts for its new buildings, etc. The new Prendergrast, (Tenn.) Mills have let all contracts for buildings and machinery. The new mills at Sylacauga, Ala., will be known as the Eva Jane Mills.

NEW ENGLAND MILL SITUATION.

(*Special Correspondence*).

Were the spectre of tariff reduction out of the vision of New England cotton manufacturers they would feel very well content with the progress that has been made in the market for cotton goods. The annual meetings that have been held recently have disclosed a change toward better things in earnings, and the fourth quarter of the fiscal year at Fall River showed average earnings of better than 1½ per cent, and average dividends of 1.09 per cent. In other words, the long seige of depression is behind the mills, and they are now hopeful of a steady gain in profits.

The demand for merchandise has been active since the middle of October, and some large sales have been made in a quiet way. Many of the leading corporations are carrying very much lighter stocks than those of a year ago, while their orders show a better prospect of steady running for the winter than was the case a year ago. In some respects, trade could be very much better. The fine-combed yarn cotton goods mills are still far from being on a normal basis of operation. In New Bedford it is estimated that the production is at least 15 per cent shy of high water mark. Fall River mills are not operating more than 85 per cent of capacity due to the shortage of labor.

The mills as a whole did not recognize that cotton was a purchase in the early days of October, and it is pretty well understood that large buying did not begin until the exchanges had turned upward in a sharp way. There are exceptions where some mills have bought liberally, but on the whole it is doubtful if the mills can average better than May in cotton supplies. The fine staple cotton mills have not rushed to the market this year as many fine yarn mills are actually running on coarse numbers because of the demand for voiles, and other goods calling for comparatively low numbers for this section.

The print cloth mills have sold liberally in the past month. Prices have advanced a full ¼ cent a yard on wide print cloths and on some constructions the advances have been sharper. On 39-inch 68 x 72s, sales have been made at 5¾ cents; 38½-inch 64 x 60s, 5⅛ cents, and 4-yard 80 squares, 7¼ cents. Narrow print cloths have ruled quiet, although prices have held firm and stocks are light. Print cloth yarn convertibles, such as warp sateens, twills, and odd counts of special construction have been bought through the late months of this year and in some instances into March. As a rule Eastern mills have not sold wide convertibles on contract as freely as Southern mills.

The fine gray goods mills have been doing a fair reorder business principally on deliveries extending to February. It has not been easy to induce mills to accept later trades on account of price differences. Shirtings, voiles, silk striped goods, silk and cotton dress fabrics, poplins, and crepes, have been the best selling goods on reorders for converting purposes. There has been a dearth of orders on lawns, batistes, and similar fine plain cloths. Mills have been unwilling to take orders on goods not already in the looms, difficulty being encountered in securing operatives willing to take on new work. Manufacturers of fine goods are able at the present time to show a better margin of profit than at any time this year, yet they are still far from a level of profit comparable with that current in good years.

Staple narrow prints have been quieter than usual. The Algonquin Printing Company advanced its line to a basis of 5¼ cents this month. The printers of percale are busy and robes are also in good call. There is a very light and most unsatisfactory demand for printed lawns, organdies, and other printed fabrics for the spring trade. As a rule the printers are not overly busy. Those engaged on staples are expecting to hear from the abandonment of the policy of protecting prices to the jobbers, and it is believed that abandonment will be followed by a more active trade.

Bleached cottons are firm at the present time, but during the past month the decision of a few large distributers in letting out goods on memorandum led to confusion and hesitation in the jobbing centers of the West. For a time it looked as if bleached cottons were going to drop and bring the rest of the market down with them. Owners of Fruit of the Loom and Wamsutta goods declined to place goods on memorandum and declared that they saw no justification for lower prices with producing costs high and with cotton showing signs of strength. This announcement was followed by a general stiffening of the market and active purchasing of unbranded lines, so that at the close of the week just past 4-4 64s bleached had jumped back to 6 cents, and 4-4 68 x 72s bleached from 6⅛ cents up to 6⅝ cents. At this time it is said that Fruits will hold at 8⅝ cents for some time to come.

The gingham situation has not changed much in the interval. There are a few mills whose goods for spring distribution are under order. The general average of sales, however, was not high enough to take care of a full output of all the mills on dress ginghams. The staple gingham market has ruled very steady and is sold ahead for the balance of the year. Shirting chambrays have sold very well to the cutting trade. The demand for crinkled seersuckers has also been good from the cutting trades so that gingham looms are well employed as a rule.

There has not been a season for five years when napped cottons of all kinds were as strong as they are at this moment. There are no stocks in first hands and jobbers are ordering goods for delivery all through this year, even though a new season has not yet started. The wide napped cottons for the cutting trades have been ordered so freely

that the leading mills will take no further business and guarantee deliveries beyond April. Canton flannels of the heavier grades are fully under order for months to come in the leading Eastern mills.

The demand for cotton blankets has kept up so steadily all this fall that leading selling agents are paying very little attention to the formal opening of a new season. New prices will not be announced until after January 1, and in the meantime the full product can be sold for delivery to the jobbing trade into February. At the present time prices are more satisfactory than they have been, largely so because of the dearth of the spot supply of some of the best qualities. There has been a very good trade this fall on napped shirtings and yarn dyed, napped, cotton dress goods. In some instances these are new products and have been offered in a limited way.

There has been no set-back in the condition of the heavy colored cotton goods markets. Tickings are as well sold ahead now as they have been at any time this year. The denim mills are sold as far as agents will take business which is generally up to February 1. Colored duck is in a better market position than at any time in five years, the scarcity being pronounced. The export trade in heavy specialties has not been as good this year as last up to this time. But Pepperel standard drills are under order for delivery to India as far ahead as March 1. Mills making the finer grades of corset jeans are well under order. The mills that make duck, crash, and other coarse yarn goods are enjoying the greatest volume of business known since previous to 1907.

The leading quilt mills are selling goods for spring delivery and have gathered in a larger business than last year. It is stated that the Western markets have ordered quilts in an unusually liberal way for spring, and reports here are to the effect that the three leading New England quilt concerns have orders that will not be completed much before July. A great deal of special work in quilts, for institutions, railroads, and hotels, has come forward in the past month or two and that will keep many looms employed.

The bleacheries and finishing works have been busy, but have not been as active as they can be. At the same time there is a good deal of rush business offered, and the chief complaint is in the conservative tone displayed in placing orders for later delivery. The machine shops are running full time. Some of them are giving employment to complete working forces. They could do a larger business if occasion demanded, but are affected to some extent by the caution that is inseparable from cotton manufacturing when the tariff issue is a live one.

In a recent trip through New England an effort was made in a private way to learn just how cotton manufacturers feel concerning the prospects of tariff revision under a new administration. There is no reason to doubt a willingness among many well-known protectionists to consent to a revision downward that will not be drastic. There a great deal of frank talk heard concerning the lack of wisdom in adding a tax on mercerization in the Payne-Aldrich bill and in adding other things that were not essential and which did not meet with the approval of many manufacturers at the time.

It is known that some of the Democrats elected from New England are protectionists to some extent at least and will not vote for party measures that attempt a drastic revision downward of textile schedules while nothing is done with other schedules. For this reason it is assumed by many leading manufacturers that less harm will come from the actual revision than is likely to come from the prolonged congressional agitation preceeding it.

COTTON CROP CONDITIONS AND A REVIEW OF THE MARKET.

Contributed exclusively to COTTON.

BY H. AND B. BEER, NEW ORLEANS.

Since our last review of one month ago the market has experienced an unexpected sharp advance of about 160 points, or about $8 per bale. The big improvement in values was due to the appearance of killing frost throughout the northern half of the cotton belt on November 2 and 3, and as it was thought that the cold weather put a stop to further growth, the smaller of crop estimates, less than 14,000,000 bales, were looked upon as being approximately correct.

Some of the crop estimates have been as low as 13,400,000 bales, and as Mess. Neill Bros., London, estimated this season's consumption at about 14,500,000 bales, perhaps 14,750,000 bales, the trade became alarmed and bought spots and futures without reserve, and as the public was influenced to buy for investment by so much bullish literature appearing in print, a steady advance in the price of the staple has been the result.

In the meantime spinners have bought largely of contracts and of spot cotton, so much so that exports thus far this season are nearly as large as they were to even date last year, 2,895,000 bales, against 2,939,000 last year, and spinners takings of the world to last Friday were 2,179,000 bales compared with 2,309,000 one year ago.

Our version of the situation is that mill men were eager buyers of the crop in the Southwest, where it was large and of a better grade than in the Southeast where the crop is smaller than last year and the grade not up to the standard, which faults were due to the climatic conditions, the section of the belt west of the Mississippi river having been favored with more favorable weather than the east Gulf and Southern Atlantic states.

But there is evidently a disposition on the part of many people to exaggerate conditions insofar as the eastern portion of the belt is concerned, and to minimize the promising situation in the western half of the belt. We believe that the eastern half of the belt will make a better crop than generally expected, and that the Southwest will make a much larger crop than generally looked for, as present indications still point strongly to the probability of the crop being 15,000,000 bales, and we doubt if the consumption of American cotton this season will be much over 14,000,000 bales.

It is to be remembered that the crops of Asia were short last year by fully 1,000,000 bales, and that America was called upon to furnish the deficit, which accounts for the consumption of American last year being 14,500,000 bales. But this year the crops of India and Egypt are said to be large, fully 1,000,000 bales greater than last season, and it follows, therefore, that the world will probably need less of American this year than was used last year.

Despite the large consumption of American cotton by the world last year, the world's total production, despite the shortage in Asia, was about 1,500,000 bales in excess of

requirements. This year, if America makes 15,000,000 bales, which is indicated, and Asia about one million bales more than last year, the total production of the world will be about the same as last year. Consequently, unless the world consumes more cotton this season than it did last season, the world's visible and invisible, which at the moment is the largest on record, will be increased to the extent of about 1,500,000 bales at the close of this season. Under the circumstances we fail to see where there is a possibility of a famine in cotton this season, and, all things considered, feel that the present high level is unwarranted and will not be maintained.

The last census report on the quantity of cotton ginned to November 1 shows every indication of Texas making about 5,000,000 bales this year, and of Oklahoma, Arkansas and Louisiana making more than last season, perhaps Mississippi also, Alabama will do fairly well, the Carolinas also, Georgia being the worst off. The war in Turkey is not favorable to trade in Southeastern Europe, and there is no telling how the European political situation will terminate.

THE YARN MARKET

The yarn market for the last month despite the presidential election and the overwhelming Democratic victory, has been one continuous and steady advance. This advance has principally been in amount of business booked, but prices also have shown some tendency upward. Mills have shown themselves very conservative on their forward contracts and the stiffening in the raw cotton market has only incited steady determination on the part of the spinners to holds their own.

During the middle of October there was a slight break in the price of Southern combed yarns and this was expected to pave the way for the general price decline. This prophecy did not materialize. The knit goods manufacturers were doing a rushing business and deliveries on old contracts were good with receipts of yarns from the South showing a steady increase.

The close of October showed combed yarns in both singles and ply's to be still in good demand, but prices continued irregular. Some few weavers covered on yarns until April and others until the first of the year. Many, however, still clung to the hand to mouth buying

The first of November found buyers paying advances for deliveries in January. Knitters tried in vain to do business below a basis of 19 cents for 10's on Southern frame cones. In the Boston market there was an active inquiry for cotton yarns during this period with prices ruling strong and with an upward tendency. Spinners were in a strong position to dictate prices as most of them were well sold up and had no stocks of importance in the market. Some numbers were very scarce indeed. There was some talk that the spinners might be bluffing in regard to prices, but when a spinner refuses to quote prices and returns orders offered at the top prevailing prices on the ground that he cannot make deliveries until February or March, it is a pretty safe indication that he is not bluffing. Immediately after election the knitters became active buyers and purchased 10's frame cones at 19¼ cents. The immediate result of the election seemed to be a strengthening of spinners quotations and an indication that they were not anxious for business except at their own price. The Eastern dealers became very bullish in yarns and it seems to be only a question of supply and demand with the weavers and knitters compelled to pay the prices asked by the spinners.

At the time of writing the dealers who have been underselling the market as far as the spinners are concerned, were forced to stiffen up prices as they found it more and more difficult to get yarns for quick delivery. The spinners paid high prices for raw cotton and have had difficulty in getting cotton suitable for their requirements and are consequently very firm in their price ideas. Many numbers of yarns have advanced from one to two cents a pound since election and yarn dealers still report trade as active. They are bothered in getting the yarns in the exact limit they are calling for. Many commission houses have had a larger trade than they anticipated and the difficulties attending the replacement of stocks have caused many houses to advance prices or hold present stocks for the advance.

Following are recent New York quotations:

SOUTHERN SINGLE SKEINS.

4s to 8s	18½@..	22s	23 @..
10s to 12s	19 @19½	24s	23½@..
14s	20 @..	26s	24 @..
16s	20½@..	40s	35 @36

SOUTHERN TWO-PLY SKEINS.

4s to 8s	18½@19	36s	38 @..
10s to 12s	20 @20½	40s	38½@39
14s	20½@..	50s	47 @..
16s	21 @..	60s	52 @..
20s	23 @..	3-ply 8s upholstery	19 @..
24s	24 @..		
26s	25 @..	4-ply 8s upholstery	19 @..
30s	27½@..		

SOUTHERN SINGLE CHAIN WARPS.

10s to 12s	19 @19½	24s	23½@..
14s	20 @..	26s	24 @..
16s	21 @..	30s	27 @..
20s	22 @..	40s	37 @..
22s	22½@..		

SOUTHERN TWO-PLY CHAIN WARPS.

8s to 10s	19½@..	26s	26 @..
12s to 14s	21½@22	30s	27½@28
16s	22 @..	40s	39 @..
20s	23½@..	50s	44 @..

SOUTHERN PEELER FRAME CONES.

8s	19½@..	18s	21½@..
10s	20 @..	20s	22 @..
11s	20½@..	22s	22½@..
12s	20¾@..	20s	23 @..
14s	21 @..	26s	23½@..
16s	21¼@..	30s	24 @24½

There has been somewhat of a decline in the imports of indigo into the United States during the past three fiscal years as shown by the following statistics:

Classification.	1909	1910	1911
	Pounds.	Pounds.	Pounds.
Crude	8,249,975	7,636,690	6,908,751
Carmined	23,772	17,869	12,575
Extracts or paste	148,454	142,831	105,493

The crude indigo comes in free of duty. The carmined is dutiable at 10 cents per pound and the extract or paste at three-fourths of a cent per pound.

THE KNIT GOODS MARKET.

The knit goods market for the past month has shown a continuation of the prosperity that was described in these columns a month ago. During the middle of October the jobbers' greatest concern was to secure delivery. It was next to impossible to place duplicate orders on merchandise for winter and get a nearby delivery. Even underwear deliveries on orders were in many quarters considerably behind and retailers the country over were finding the consumers' demand much greater than was anticipated. In the hosiery end of the market this same scarcity has been noted and many buyers continued to forego particular packing for the sake of getting the goods. Another serious feature that has developed in the state of New York has been the new law for decreasing the hours of labor from 60 to 54 a week, and this is proving to be a serious proposition for the knit goods trade. This law could not have come at a worse time in view of the existing shortage of knit goods and a large quantity of orders on hand. Labor in many sections was already scarce and a curtailment of the working time makes the situation very hard, not only on the mills, but also on the buyers of goods and the jobbing and retail trade. The opinion had been freely expressed that the shorter hours would really not mean a corresponding decrease in production, because of the idea that much of this work was done on piece work rates and the operative would naturally make an extra effort to produce the same wage in a shorter working time than before. One manufacturer is quoted as saying, however, that the new law meant absolutely a curtailment in production and an increase in expense. He said that this had been the experience in other lines of work and would be the same in the knitting mills. This same manufacturer also indicated that it would probably mean higher prices for another season. One effect that this change in the law is having, is seen in the numerous reports of new knitting mills being proposed or constructed in various sections of the South and particularly in the state of Tennessee.

The last of October saw the opening of several lines of sweater coats for the 1913 season, and one selling house reported that the demand had been so active that its line would probably be withdrawn at an early date. These early openings were in contradiction to the opinion that had prevailed that the new goods for fall, 1913, would not be shown until after election.

The first of November found re-orders coming forward on spring lines very rapidly and many manufacturers well sold ahead. Ribbed union suits to sell at $1.00 per garment had good request and promised to be large sellers throughout next spring and summer. Two-piece union suits also sold well and manufacturers of these goods have no complaint to make regarding their advance spring business. Some manufacturers of silk hosiery marked up prices on their 50 cents lines, 15 cents a dozen on blacks, and 25 cents a dozen on colored goods.

The developments in the cotton market during the early part of November, during which the price of that staple was somewhat unsteady with an advancing tendency, complicated matters in the underwear trade to a considerable extent. Particularly was this the case with the New York State mills which were also troubled with unsettled labor conditions. The selling season for underwear opened up under conditions that appeared to be extremely favorable, more so in fact than for several years past. The events of this season are expected to change the attitude of buyers toward covering their wants at an earlier date, and the radical advance in prices that have been made, together with the short supply, should cause reflection on the part of the buyers who have dallied by the wayside in an effort to climb in through a basement window. While there has been some rumors of possible changes in the tariff under the new administration the suggestion has been lightly received by many members of the trade. The present satisfactory condition of the home trade of the German hosiery industry is such that it will practically remove it from the sphere of competition with the mills in this country.

At the time of writing the prices have not yet been made on most fall underwear, and manufacturers under the present unsettled conditions in the cotton market are not in a position to determine advances for another season. Cotton yarns have stiffened materially in their prices and these prices together with the higher labor costs indicate that prices on underwear will have to be advanced before very long. Prices on sweater coats are averaging about ten per cent higher this year than last, but business is showing up well in spite of advances. In the hosiery end of the market many lines have been opened for next fall and the initial advance business put through. Prices are being marked up and in one or two quarters cotton hosiery has been advanced 2½ cents a dozen. Because of the well sold up condition of the market buyers seem to be willing to place fall 1913 orders. Silk hosiery manufacturers are heavily under order for the spring and summer of next year and are steadily booking up orders for next fall. Leading manufacturers in cotton underwear are still holding back prices and awaiting developments. If safe and sane methods are used in handling the tariff reduction question it is very doubtful if American knitting mills will feel a resultant shock immediately. If, however, the methods adopted follow along the lines indicated in the attempted revision of Schedule 1 earlier in 1912, it will be hard to forecast what the final results would be to the knit goods manufacturers.

The shipments of sheeting to the interior of Manchuria from Dairen in 1911 were as follows: Japanese sheeting, 569,020 pieces; American 20,137 pieces; English, 4,106 pieces. The shipments of drills were as follows: Japanese, 132,485 pieces; English, 2,597 pieces; American, 2,565 pieces. Japanese yarn to the extent of 22,395 piculs were shipped to the interior; Indian to the extent of 2,643 piculs; and English to the extent of 795 piculs. (Picul equals 133⅓ pounds.) The cotton goods shipped over the railway for the entire year reached a total of 28,186,937 yards.

The state of the import trade in cotton yarn from India into China is causing considerable apprehension in India. It is noted that whereas the imports of Indian yarn into Shanghai in 1907 amounted to 74,043 tons of 2,000 pounds each, it fell in 1908 to 59,000 tons, recovered in 1909 a little, to 66,060 tons, dropped again in 1910 to 48,850 tons, and in 1911 almost collapsed, running down to 31,975 tons. While the revolution in China had considerable to do with this low figure, it is evident that the competition of Chinese and Japanese made yarns is having a most marked effect upon the trade.

COTTON MANUFACTURING.

COTTON MILL MACHINERY CALCULATIONS.

Contributed exclusively to COTTON.

BY B. M. PARKER.

PART XXI.

LOOM EQUIPMENT.

In our previous figuring we have not taken into consideration any calculations for determining the production or number of looms, the figures given being intended for a mill making yarns for the market. When figuring a program for a weaving mill, the number of looms to install and the sizes to spin our warp and filling must be settled. It is first necessary to decide upon the style of goods to be made, that is, the weight per yard, the width of the cloth and the number of threads of warp and filling to use.

Suppose it is desired to build a mill to turn out plain cloth, 40 inches wide, 68 threads of warp and filling each per inch, the cloth to weigh at the rate of 4 yards per pound. This would be expressed as 68 x 68, 40 inches, 4 yard goods. The looms are to run at 160 picks per minute and allow for a loss of 15 per cent in production for stoppages, etc. The mill will contain approximately 20,000 spindles.

The first step to take is to determine the size yarn to spin for our warp and filling. To do this we must figure the average number of yarn in the cloth and from this we can select the size of warp yarn to use and figure the corresponding size of filling yarn. On the above mentioned class of goods, the warp and filling will take up about 8 per cent in weaving, and the warp will increase in weight, due to the added size, about 6 per cent. Then, $68 \times 40 = 2720$ ends in the warp and $2720 + 24 = 2744$ ends in the warp, including 24 ends extra for selvages. As the warp yarn contracts 8 per cent in weaving, it will take 108 yards of warp to make 100 yards of cloth, then $2744 \times 108 = 296{,}352$ yards of warp yarn in 100 yards of cloth. The increase in weight of the warp yarn, due to the 6 per cent size added, can be figured as a 6 per cent increase in the number of yards, and, $296{,}352 \times 1.06 = 314{,}133.12$ yards. Reducing this to hanks, we get: $314{,}133.12 \div 840 = 373.76$ hanks of warp yarn in 100 yards of cloth.

The width in the loom will be: $40 \div .92 = 43.47$ inches. Then, $43.47 \times 68 \times 100 \div 840 = 351.9$ hanks of filling yarn in 100 yards of cloth, and, $373.76 + 351.9 = 725.66$ total hanks of yarn in the 100 yards of cloth.

The cloth weighs 4 yards to the pound and 100 yards will weigh 25 pounds, then, $725.66 \div 25 = 29.02$ or practically 29's yarn for warp and filling.

It is customary to spin the warp yarn several numbers heavier than the filling, so we will decide upon 27 combs for the warp and figure the corresponding size of filling. We found that there would be 373.76 hanks of warp yarn in 100 yards of cloth, then, supposing it to be 27's counts, $373.76 \div 27 = 13.84$ pounds of warp yarn and $25 - 13.84 = 11.16$ pounds of filling yarn. Then, $351.9 \div 11.16 = 31.53$ counts of filling yarn.

We found that there would be 13.84 pounds of warp and 11.16 pounds of filling yarn in each 100 yards of cloth, or 55.3 per cent of warp and 44.7 per cent of filling. Then, for every 100 pounds of yarn spun, there will have to be 55.3 pounds of warp and 44.7 pounds of filling and the total 20,000 spindles must be divided to spin the yarn in the above proportion.

SPINDLES.

Assume a speed of 9,500 revolutions per minute for the warp spindles and allow 10 per cent for loss of time. Production constant for the above condition is 165. The twist is 24.68 turns per inch. Rule for using production constant:

Production constant divided by the counts multiplied by the twist per inch will give the pounds per spindle for a 10-hour day.

Applying this rule after finding the amount of production per spindle, we have $165 \div 27 + 24.68 = .247$ pounds per spindle, and $55.3 \div .247 = 224$ warp spindles.

Assume the filling spindles to have a speed of 8,300 revolutions per minute, and allow for 10 per cent loss of time. Production constant, for above spindle speed, is 147. The twist is 18.24 turns per inch. $147 \div 31.5 \times 18.24 = .255$ pounds per spindle per day. Then, $44.7 \div .225 = 175$ filling spindles.

Now it will be seen that, to produce the 100 pounds of warp and filling, it will require 224 spindles on warp and 175 spindles on filling or in the proportion of 56 per cent warp spindles and 44 per cent filling spindles and as the total of 20,000 spindles must be divided accordingly, we will have 11,200 warp spindles and 8,800 filling spindles. Dividing the above into frames of 208 spindles each will give 54 warp frames and 42 filling frames.

The production per spindle per day on 27's warp was found to be .247 pound, hence, $11{,}200 \times .247 = 2766$ pounds of warp yarn produced, and the production per spindle per day on 31.5's filling was found to be .255, hence, $8800 \times .255 = 2244$ pounds of filling yarn produced and the total amount of yarn produced would be:

$2766 + 2244 = 5010$ pounds.

Allow for an average loss of 2 per cent in weaving the above yarn, we would expect only 4909 pounds of cloth to be produced per day.

LOOMS.

The following rule will give the production per loom in pounds:

Multiply the picks per minute by the minutes per day, with the allowance for loss of time and divide by the product of the picks per inch multiplied by 36 and by the yards in one pound of cloth.

The speed of the looms was taken at 160 picks per minute and allowing for 15 per cent loss of time, the following will give the production per loom:

$160 \times 600 \times .85 \div 68 \times 36 \times 4 = 8.33$ pounds.

We find that there would be 4909 pounds of cloth produced per day, then $4909 \div 8.33 = 588$ looms.

Assuming a given number of looms and figuring the spindles required for these looms is more direct, but we can form no exact idea of the number of spindles required until the work is completed. Where it is desired to have a

given number of spindles, the above method is correct.

In installing the above spindles, it is advisable to order several frames with combination builders so as to be able to spin either warp or filling yarn on them. In this way, the process is more elastic and permits the spinning of a greater or less quantity of either warp or filling, as the requirements of the case might call for.

THE END.

[Note.—At the conclusion of this series of cotton machinery calculations, Prof. Parker expects to republish them in book form. This announcement will be of especial interest to those later subscribers to COTTON who have been unable to secure back numbers.—Editor.]

DRAFTS ON THE DRAWING FRAME.

BY D. E. TRASK, CHATTANOOGA, TENN.

A year or two ago in a discussion on the subject of causes and prevention of uneven yarn, the carding department came in for its share of the causes, and the care and operating of the drawing frames and speeders was included in a number of the valuable papers on the subject.

I have noticed of late that some writers advocate reducing the number of doublings and short drafts. In my way of thinking and my experience, I do not agree with them in their views, because, more doublings remedy bad piecings, length of light strands caused by uneven laps and by laps running out, and the new lap replaced, also the light work caused by the stripping of the card.

The doublings have also a large tendency toward making even and uniform yarn. It often happens that the carder cannot arrange his drafts so they will be the best theoretically, as each process must keep up with the other, and the drafts must be so arranged that the production must balance, each with the other, of the different processes. And in so balancing the different processes, the drafts are often excessive to the detriment of good work and even yarn. The question is, what is excessive draft?

This is a question that has a broad field of opinion, and while I will not even try to lay down a rule, I will express my views and beliefs. I am a firm believer in short drafts and enough machinery in the different processes for the making of good yarn. For the last few years much of our cotton has kept diminishing in the length of staple. The cotton crop of 1911 has been proven by statistics to have contained a larger percentage of waste than for any previous year. But we still adhere to our same drafts to the detriment of the quality of our yarn.

In the arrangement of the drafts in the carding room, the number and production of the machines in the different processes and the finished production required have to be taken into consideration, many times to the detriment of the work, as better work could be produced with these drawbacks eliminated. Then, there is the kind of goods to be made, the quality of same the number of yards to be spun, and the grades of cotton used. All these have to be considered.

Drafts that would be appropriate for one class of goods or yarns would not be practical for other kinds. It is therefore impossible to have a fixed rule of drafts for the several classes of goods, yarns and cotton used. In treating this subject, I will take, for example, the making of yarns, say from 10's up to 24's, with the required number of machines in the different processes to give the finished production required, and at the same time a first class yarn, using good middling North Georgia cotton.

Starting with an eleven ounce lap and a draft of about 85 on the cards, this will give us a 52 grain sliver, and with three processes of drawing, with a draft of about 4.60 on the back drawing, or first head; 5.60 on the middle or second head, and 5.96 on the finisher, this will give about a 60 or 62 grain sliver for the slubbers, making a one-half hank slubber roving. This keeps the draft within the limit of four, which I think should never be exceeded on a slubber.

On the intermediates make a one hank, and one and one-half hank roving. This keeps the draft from four to six for the intermediates, and on the finisher speeders a three and five hank roving. This keeps the draft between six and seven. On the spinning make numbers from 10's to 14's from the three hanks roving 15's to 24's from five hank roving. This will keep the drafts from about 6.70 to 9.70 on the spinning. I do not think that the draft should exceed ten on the spinning running this grade of cotton. In mills where there is no changing from one number to another, the draft could be arranged to work as a medium of the two extremes.

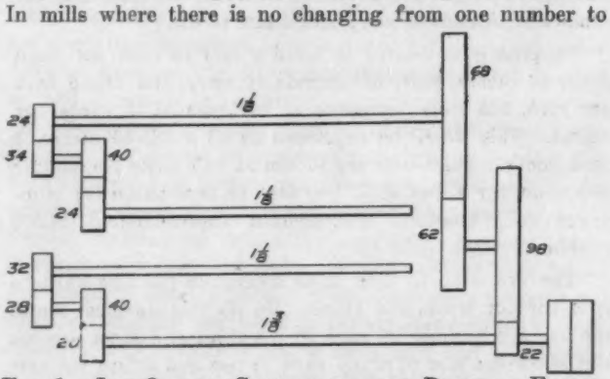


FIG. 1. LAY-OUT OF GEARING ON THE DRAWING FRAME.

We will now refer back to the drawing frame, about the drafting of which I would like to say a few words. The machinery builders in turning the frames over to the mill have the drafts so arranged that there is considerable leeway for the draft gear used.

We will presume that the right gear is put on and the draft between the second and third rolls is about right. The mill makes changes, a different hank card sliver is made, probably heavier, which is generally the way when the call is for more work, and the draft gear is changed on the drawing, and perhaps the draft between the second and third rolls equals or exceeds the draft between the first and second rolls. On the other hand perhaps the first and second rolls are doing all of the drawing.

Here is a point where it is essential to figure out the intermediate drafts when making a change, and knowing just what the different drafts are between the several rolls. I believe in having a fixed draft for the work running, and not to change the draft gear unless for a tooth one way or the other. If a radical change is necessary, redraft the frame and put on gears to make it.

For illustration, we will take the finished drawing frame, with the approximate draft of 5.96, leaving out the draft between the front rolls and the calendar roll, which we all know is regulated by testing and experience.

In Fig. 1 we show the different gears for a draft of 5.96. We will now first get the draft constant.

*Extracts from a paper read before the Southern Textile Association.

98 × 68 × 11 ÷ 22 × 9 = 370 draft constant.

Draft constant divided by draft equals draft gear. 370 ÷ 5.96 = 62 draft gear.

To get the draft between the first and second rolls: 40 × 32 × 11 ÷ 20 × 28 × 9 = 2.793 or 2.80 draft.

To get the draft between the third and fourth rolls: 24 × 40 × 8 ÷ 34 × 24 × 8 = 1.18 draft.

Having the draft between the first and second and the third and fourth rolls. We multiply these drafts together and divide the product into the whole draft and the quotient will be the draft between the second and third rolls.

2.80 × 1.18 = 3.30. 5.96 ÷ 3.30 = 1.80, or the draft between the second and third rolls.

In computing this draft, to get the sum of two drafts, they should always be multiplied and the difference divided. Some carders believe in doing most of the drawing between the first and second rolls. I have always adhered to and think it a good rule to have the drafts between the second and third rolls within one or near one as possible of the draft between the first and second rolls. That is, if the draft between the first and second rolls is 2.80, make the draft between the second and thrd rolls 1.80, or as near that number as possible, and the third and fourth rolls as near 1.20 as possible, but not over.

The speed of front roll should be 400. On metallic rolls the actual draft is about nine per cent more than the figured draft. In starting a new room or changing from light to heavy product, or *vice versa* to get the proper draft for each process, you multiply the hank drawing wanted by the doublings and divide by the hank carding; extract the cube root from this sum and the answer will be the draft for each process to produce the required finished drawing.

Suppose, for instance, that a 60 grain finished drawing sliver is wanted from a 52 grain card sliver. To get the hank drawing: 8.33 ÷ 60 = .138 hank drawing. To get the hank carding: 8.33 ÷ 52 = .160 hank carding.

We will say that we have (which should be) three processes of drawing with a doubling of six. The product of the doublings is 6 × 6 × 6 = 216 hank drawing.

216 × .138 = 29.808. 29.808 ÷ .160 the hank carding, = 186.3. The cube root of 186.3 is 5.71, which is the draft that should be used in each process. In dividing this draft, I would advocate drawing one less on the back drawing than on the middle drawing and having about .50 less on the middle drawing than on the first drawing or finisher.

An American consular officer in a Mediterranean country reports that a business firm in his district wishes to be placed in communication with American exporters of raw cotton, with the object of buying direct. This firm is in a position to become a large importer of cotton and is connected with cotton mills. References will be given, and correspondence should be in Italian or English. For further information apply to the Bureau of Manufactures, Washington, D. C., and refer to file No. 9302.

The aggregate value of cotton woven goods manufactured in this country in 1909, exclusive of narrow fabrics such as tape and webbing amounted to $456,089,401. This is an increase of 87.5 per cent in comparison with the values of the same manufactures for 1899.

CARDING COTTON FOR HIGH-CLASS YARNS.

Contributed exclusively to COTTON.

BY K. T. J.

Kind of card used, revolving top flat; and using for cotton nothing lower in grade than strict middling.

Having prepared the cotton properly by cleaning it and making a good firm lap free from thick and thin places, and having a good even selvage, the lap is placed on the card, to be further cleaned and converted into sliver.

The lap being placed on the lap roll, is then drawn in over the feed plate, to the lickerin, by means of a feed roller, and is taken from the lickerin by the cylinder. It then passes from the cylinder to the doffer, and then to the calendar and coiler rolls, and into the can.

Hold up some of the webb, as it comes from the doffer, and examine it thoroughly, and if it is free from imperfections, such as nepps, motes and cloudy spots, or unevenness, it can be said to be carded properly for high-class yarns and fabrics. If it is not free from these imperfections, by all means go to work and don't stop until you have it as near perfect as conditions will permit.

Taking 165 revolutions per minute, which is the speed recommended by the machine builders for the cylinder, I am, after making several tests, fully convinced that 150 pounds net per 10 hours for a 40-inch card is the limit, where good carding is absolutely required. But, of course, more can be put through with a sacrifice of quality.

One particular test I made was with a card with the cylinder making 165 revolutions per minute, with a diameter of 50¾ inches and a doffer of 26¾ inches over clothing. The card had been running 10 years, and at the time I made the test, was doing about 178 pounds per 10 hours, and to say that the work was fearful wasn't overdoing things a bit. The doffer was making 12½ revolutions per minute, and the sliver weighed 70 grains per yard. The weight of the lap used was 16 ounces per yard which, after allowing for waste, made the card have a draft of about 90. The card at the time the test was made was only taking out about 12½ per cent of the strippings, and hardly any motes or flyings.

The first test I made was with the same doffer speed, 12½ revolutions per minute, but I changed the draft so as to produce a 60 grain sliver, which gave 151 pounds production per day of 10 hours.

The next test I made was with the doffer making 11½ revolutions per minute, producing a 65 grain sliver, which gave me the same production of 151 pounds.

The last test I made was with the doffer making 10 revolutions per minute and producing a 75 grain sliver, which gave me the same production of 151 pounds, as in my other two tests.

The product showed some improvement in quality, but was far from perfect, even after the production was reduced from 178 to 151 pounds, I could not detect any difference in the quality of the carding of the different tests, owing to the condition of the clothing and the manner in which they were set up. The lickerin had low places in it, and some teeth bent down. The feed plate was worn badly in some places, caused by the lickerin rubbing it. The mote knife was set to .017, which is too far. Lickerin to cylinder, .012 inch. Screen to cylinder ⅜ inch at the front, and .034 at the back. Back stripping plate .012, and front

stripping plate .017; flats to cylinder .012; doffer to cylinder .010 inch.

The clothing on the cylinder was tight, but an irregular surface, caused by being ground with a flat grinder. The clothing had been redrawn once, and was pieced at the ends with clothing which was somewhat lower than the rest, which soon filled up and caused the selvage to be very cloudy and full of nepps. Four of the flats had been reclothed, and the clothing was higher on these four than on the rest, which necessitated all the flats being set too far from the cylinder to keep the high ones from rubbing.

The doffer clothing was bruised badly, caused by the card hand letting the card run with the end down, until it choked the comb, causing it to stop and choke the doffer. Before the last test I made the following improvements:

The feed plate was taken off and the high places were filed down even with the lowest ones, which made it very nearly as straight as it was when new. The lickerin was reclothed. The mote blade was trued up. The lickerin screen, which had been badly abused, was repaired. The clothing on the cylinder and doffer was scraped up and ground, until the surface of the clothing became perfectly smooth and straight, which required eight days with a traverse grinding roll. The flats having the long wire were marked and ground down, even with the other ones by stopping each flat directly under the flat grinder, and letting it remain there until the clothing matched that of the others. It required about two days' grinding on each flat to get it to match the rest of them.

When grinding high flats they must be moved often, back and forth under the grinding roll, so that the grinding will be complete from one edge to the other.

The following is the amount in thousandths of an inch that I had the card set up after being ground and repaired: Feed plate to lickerin .012; mote knife to lickerin .012; lickerin to cylinder .010; flats to cylinder, back .012; middle, .010; and front, .007; screen to cylinder, .250 at foot and .017 at the back; doffer to cylinder, .007; back stripping plate .017; and front stripping plate, .022.

The per cent of strippings taken out was increased from 1½ to 3½, which is usually considered the proper amount. The motes of course would vary according to the condition of the cotton. After the card had been set up for work I repeated the test as before, using the same weight lap, which was 16 ounces per yard. I made the first test with the doffer making 10 revolutions per minute, the weight of sliver 75 grains, and the net production 151 pounds.

The next test I made with the doffer making 11½ revolutions per minute, the weight of sliver 65 grains, and the net production 151 pounds.

The last test I made with the doffer making 12½ revolutions per minute, 60 grain sliver, and the net production 151 pounds.

The net production being the same in each case looks as though the quality would be the same, but I must say that the last test proved to be the best so far as perfect carding or a perfect webb was the aim, but I want to say that the piecing up of ends on the card while the doffer was making 10 revolutions per minute was much less than when it was making 12½ revolutions. I am unable to account for it unless it was because the comb had a better chance to collect the cotton away from the doffer.

I then speeded the doffer to 14½ revolutions per minute, keeping everything else the same, which increased the production to 175 pounds per 10 hours, and the falling off in quality was very perceptible; besides, it made it very difficult for the card hand to put up the ends when they would break.

I find that I get better results when the surface speed per minute of the cylinder is about 26 inches to each 1 inch of the doffer. No matter what the diameter of the doffer is.

LIGHT, QUICK CARDING VS. HEAVY, SLOW CARDING.

I fully believe that there is a place half way between light quick carding, and heavy slow carding that will give perfect results, *i e* produce a webb that will be free from imperfections, and if a test is made in any mill as I made mine, I fully believe that the carding can be improved some in all, and very much in some, mills.

Now, as a matter of information to my readers, I will say that I have done quite a little experimenting with light quick carding, and I find that it has more disadvantages than the heavy slow carding or medium. One in particular is that if the draft of the card is very short and the lap is very thin, the feed plate has got to be perfect or the lap will go into the card in bunches as the feed roll will not grip it tight enough to keep the lickerin from pulling it in in bunches, which will cause cloudy or uneven carding. Another disadvantage is that the faster the doffer runs the more difficult it is to put the ends up when it breaks down, which is much oftener than it is on the medium speed. This of course causes more piecings and more waste, and also more bad work to hinder the other machines. Then we have another drawback with light quick carding with a short draft, and that is the difficulty in getting the pickers to make a good even sheet, *i e* one that is free from thick and thin places.

To those that prefer the light carding, I will say that they will get much better results by using a long card draft, and medium heavy lap which will overcome the evils that I have mentioned as all my readers will know, so far as evenness is concerned.

I have spun from 40s to 50s using strict middling cotton, from a 60 grain sliver and a 13½ ounce lap and obtained first-class results with a 40-inch card, and am at present making a high-class No. 12 hosiery yarn with a 60 grain sliver drawn from a 16 ounce lap using strict middling cotton and am getting excellent results.

To get first-class results with a card, it must be borne in mind that all the working parts must be kept in first-class shape, especially the cylinder, doffer, flats and lickerin, also the edge of the feed plate, for no matter how sharp the clothing on a card is, unless the surfaces of the above mentioned parts are straight and smooth, the carding will not be first-class. Also if any of the bearings, especially of the cylinder, doffer or licker get worn, they should be replaced with new ones at once. Worn boxes are detrimental to good carding. The screens must not be overlooked as when they get bruised or broken in any place they will not perform their duty properly. The mote blade should be kept perfectly straight on the edge and reasonably sharp, so that the motes will not slip by as they invariably get into the flats when they ought to go in the mote box.

I try to make it a rule to grind my cards a little before they need it, which is about every three or four weeks. I find that by not setting them up too close, they do not rub and get dull so quick, and I get a better average in quality than the fellow that goes to the extreme.

During my twenty years of service in cotton manufacturing I have come in contact with some carders that be-

lieved that unless the grinder was making the fire fly from one side of the machine to the other it was not grinding right, and then I have also met them that were to the extreme on light grinding. My idea of the proper way is to give a taper equal to about 1¼ times the diameter of the wire, which will give a good sharp point that will last three or four weeks before getting dull. Hard grinding beyond a doubt is injurious to the clothing also, as it is liable to get hooked, and if kept up long will become loose *i e* the wire will get loose in the cloth.

With reasonably clean cotton, properly prepared in the picker room, a card will do good work for 3½ hours without stripping, but will then begin to fall off in quality until stripped. Where good work is required, the cards should be stripped at least three times a day of 10 hours.

A bad stripping roll, one that is either bent at the spindle or the clothing bent down and the wire broke off, especially at the ends, will cause bad work, and leave lots of trash in the cylinder until it becomes embedded so hard that it will have to be picked out, and will cause the card to do bad work at the place where this trash is. I make it a point to keep my stripping roll in first-class shape, and I also see that the card hands strip the cards thoroughly, leaving nothing in the cylinder or doffer.

The oiling should be done once each day, but carefully, as oil should not be allowed to get on the clothing. Careless oiling will lead to lots of trouble, especially if some of the bearings are neglected.

There is no set rule as to how much waste a card should make, as it depends on the amount of dirt and trash in the cotton, but usually the strips taken out is from 3 to 4 per cent, and the motes and flyings will run from ½ to 1½ per cent.

DAMASK WEAVING.

Contributed exclusively to COTTON.

BY T. WOODHOUSE AND T. MILNE.

We have already indicated and illustrated what is perhaps the simplest form or method of producing patterns by means of damask or sateen weaves—we refer to the production of longitudinal stripes or stripes in the direction of the length of the piece. While it is true that there is no limit to the breadth of any stripe which may be produced at any part by means of either group of 5 or 8 shafts or harnesses, and that narrow stripes of warp flush may alternate with broad stripes of weft flush, or vice versa, it is nevertheless advisable, and in many cases necessary, that the number of threads employed in any one stripe should be a multiple of the number of shafts employed to weave such stripe. When the numbers are so chosen, each leaf will contain the same number of heddles and hence the arrangement is of the simplest and most satisfactory kind. In pure stripe designs it is an easy matter to employ any number of threads in the stripe and still insure satisfactory binding at both joinings; this is of course obtained by simply turning over one stripe to obtain the opposite effect. By this means any weave may be arranged to cut at the joinings, but the simplest method is to adopt a number which is a multiple of the weave. It is only by strictly observing this detail with regard to cutting threads, that satisfactory binding of the edges of the stripes can be secured. Inattention to this apparently minor point leads to many unsatisfactory results, not the least of which is the tendency of cloths, in which the stripes have been improperly bound, to wear thin and cut at these points after a few visits to the laundry.

It is a natural and easy step from the production of longitudinal stripes to the production of transverse stripes, that is, those running from selvage to selvage. In a sense the production of the latter type of stripe is simpler than the weaving of the former, since in the development of transverse stripes, only one group or set of 5 or of 8 shafts or harnesses is required according to the weave to be employed. As in the case of the longitudinal stripes there is again no limit to the breadth of a stripe; it will be obvious, however, that the broader such a band across the cloth becomes the less it tends to be of the true nature of a stripe—but whether the stripes be broad or narrow, it is advisable that the number of shots or filling composing them should be a multiple of the base weave used.

Transverse stripes, although capable of being woven with 4, 5, 6 or 8 shafts, invariably require the use of a dobby or other complex shedding mechanism in consequence of the comparatively large number of picks to the round; if, however, the number of picks in the round of both transverse stripes does not exceed say about 24 picks, the pattern may be woven with a Woodcroft tappet. On the other hand, the picks per round in the longitudinal stripes equal only the unit of the weave—4, 5, 6 or 8—and may therefore be produced by means of tappets of a simple and ordinary character provided that the number of shafts employed is not great. Both systems have evidently drawbacks; one requiring a small number of shafts and a large number of picks, while the other requires a small number of picks and a comparatively large number of shafts.

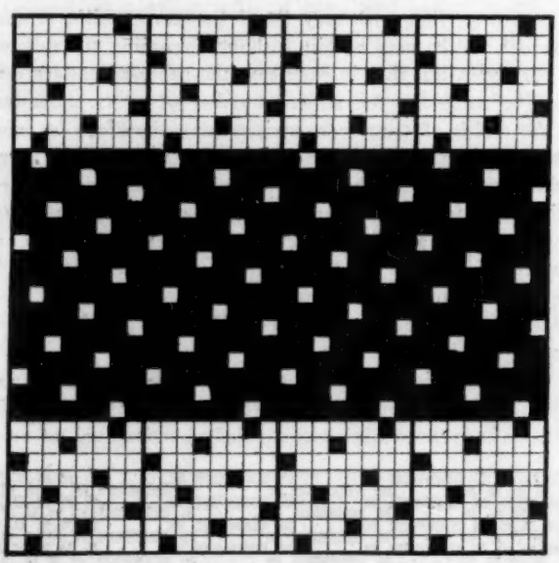


FIG. 8. SIMPLE DESIGN ON 32 THREADS AND 32 PICKS.

Fig. 8 shows a simple design on 32 threads and 32 picks for a transverse stripe based upon the two 8 thread sateen weaves. Only one repeat of the pattern is shown in the way of the weft arranged as under:

8 picks of weft flush, 1/7 sateen.
16 picks of warp flush, 7/1 sateen.
8 picks of weft flush, 1/7 sateen.

Equivalent, when produced to 16 picks of each weave. It will be readily perceived that the pattern is complete on 8 threads, and requires 8 shafts or harnesses. It will also

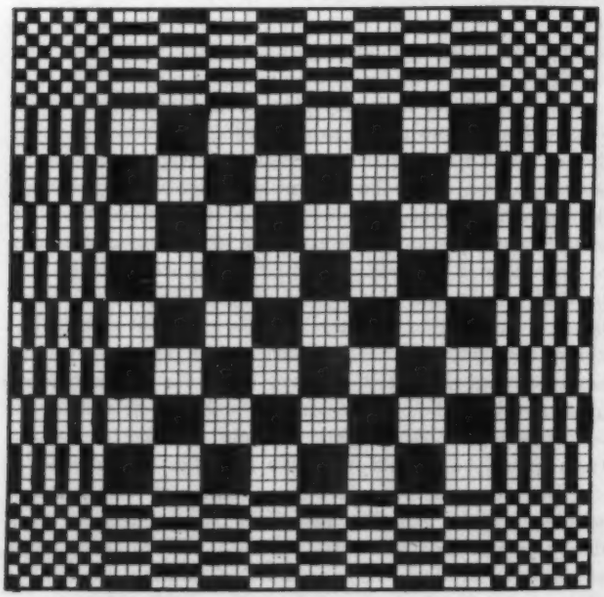


FIG. 9. COMBINATION DESIGN.

be understood that each stripe may be made either broader or narrower, that both may be of the same width, or that different widths may obtain without increasing the number of harnesses, but that in each case the necessary alterations must be made for the altered number of picks. Changes in the width of transverse stripes may therefore be more easily effected than similar changes in the width of longitudinal stripes. No change in the number of shafts are required, but for longitudinal stripes it is generally necessary to redraw the yarn in the harnesses and the reed before any material alteration in the pattern can be effected. The method of forming similar patterns by means of other sateen weaves will readily occur to any student of weaving.

Many fabrics are produced for table decoration and other decorative purposes in which practically the entire pattern is developed in stripes, chiefly longitudinal, of varying width and character; but the most extensive development of straight line ornamentation of this character is to be found in the combination of the two types in both directions. Figs. 9 and 10 illustrate two designs of this character, in neither of which is the exact weave displayed. Each as a matter of fact is a motif for a design, and every small square in the design is supposed to represent a complete unit weave on 4 by 4, 5 by 5, 6 by 6, or 8 by 8 threads and picks. Consequently:

If 4 thread weaves be used the design is complete on 192 threads and 192 picks.

If 5 thread weaves be used the design is complete on 240 threads and 240 picks.

If 6 thread weaves be used the design is complete on 288 threads and 288 picks.

If 8 thread weaves be used the design is complete on 384 threads and 384 picks.

Fig. 11 shows the thread by thread and pick by pick development of a portion of Fig. 9 where each dark square is represented in Fig. 11 by a complete unit of the 3/1 broken twill and each light square represented by a complete unit of the 1/3 broken twill. One method of arranging the draft appears immediately under the design, and for this draft the cards would be cut according to the last 8 threads in the design.

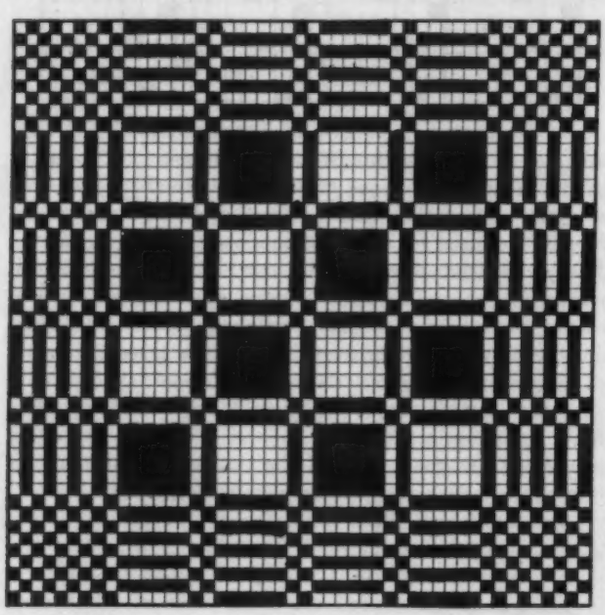


FIG. 10. ANOTHER DESIGN USING STRIPES IN BOTH DIRECTIONS.

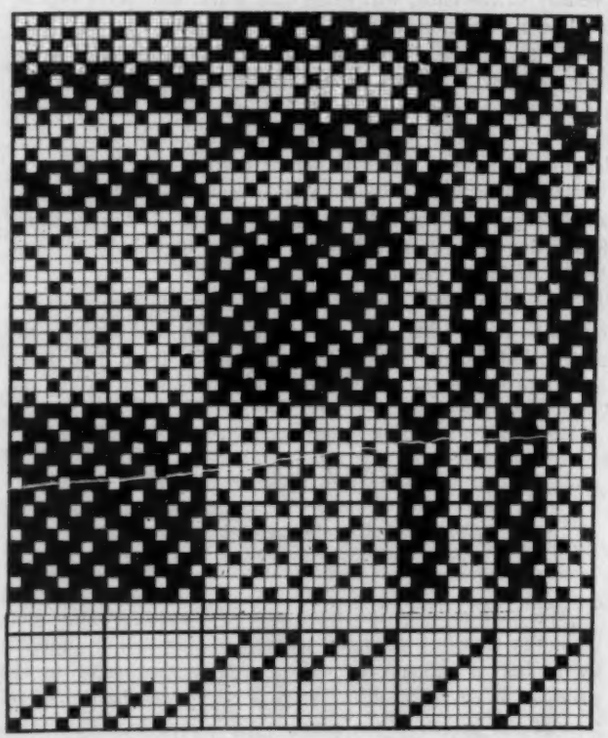


FIG. 11. DEVELOPMENT OF A PORTION OF FIG. 9. DRAFT DETAIL AT THE BOTTOM.

When two kinds of weaves, involving two sets of shafts, are used alternately as shown in Fig. 11, the patterns are often called two-division designs and would therefore require 8, 10, 12 or 16 shafts according as the two unit weaves are on 4, 5, 6 or 8 threads and picks. All two-division designs, arranged with the weaves as shown in Fig. 11, could therefore be woven with 8 shafts, no matter how many changes there are in the width. All changes in the width are accompanied by corresponding changes in the length, but this alteration, as we have already seen, is easily made by adding the extra number of cards. It is therefore possi-

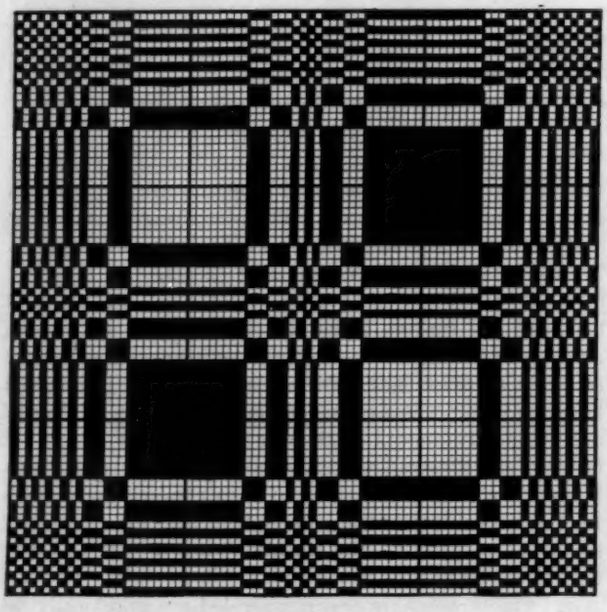


FIG. 12. A DICE DESIGN.

ble to obtain more elaborate patterns with little extra cost, and Figs. 12, 13, and 14 illustrate three large dice designs, each square of which should be increased as mentioned above, according to the weave used, when arranging the pattern or design paper. With 4 thread weaves Figs. 12 and 13 would require 320 threads and 320 picks, while Fig. 14 would require 384 threads and 384 picks, with corresponding increases in threads and picks for larger unit weaves.

Patterns of this type can be evolved in almost endless variety; and, by many, this form of ornamentation—technically termed "dicing" or "counterchange"—is considered as being the only correct type of ornament for table use. It is no doubt true that patterns of a flat and rectilinear nature formed the most ancient type of ornament to be found in connection with damask weaving, and it is quite possible that its continued practice led to the development of that most interesting and to this day, extensively practiced method of weaving, both in hand and power looms, known as the pressure harness. The antiquity of any system, however, should not, we think, be held as consecrating the results or production of that restricted system to the exclusion of those elegant and varied floral and other effects which are the result of more modern machinery.

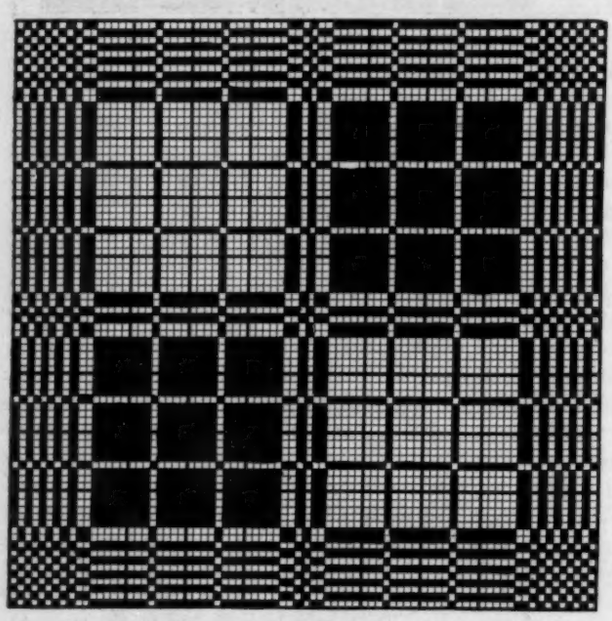


FIG. 13. ANOTHER DICING PATTERN.

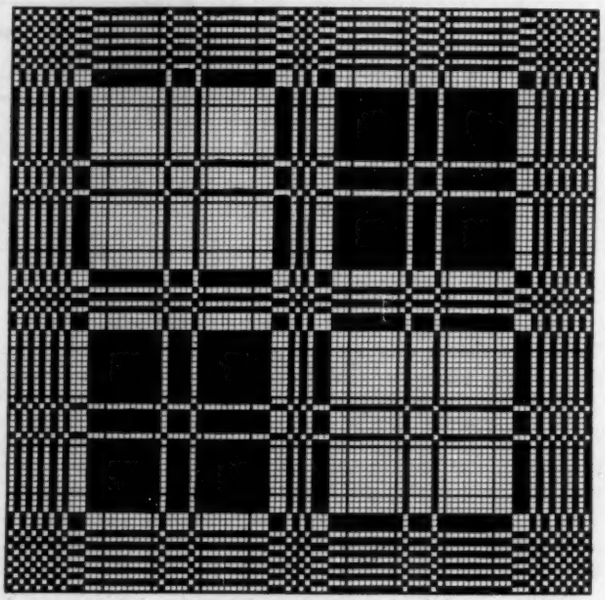


FIG. 14. MANY CONSIDER THESE DICING DESIGNS THE ONLY CORRECT STYLE FOR TABLE DAMASK.

The primary question affecting the sale of American goods in Peru are those of price, quality, terms, representation, distance from place of production, and prejudice.

European articles there, when they compete, average one-tenth to one-third cheaper than American goods. This handicap is sometimes overcome by the superior quality of the American article, but before entering this field the prices and nature of the competition to be met should be accurately ascertained. Questions of quality and local prejudice are often closely interwoven. It takes time to create a local fancy for an article, and the smallest trifle may upset the regard for the quality of an article, some minute detail found imperfect perhaps sending the order to Europe instead of to the United States.

Certain phases of industrial education have been so neglected in the United States, until the past few years, that foreigners have wondered that we have any foreign salesmen at all. Much is now being done in this line, but much remains to be done toward turning out salesmen who can show their initiative in other tongues than their own. Only quiet, tactful persistent wrok will land orders in Latin America, and the pusher and hustler is often misunderstood and gets no orders.

The time from Panama to Callao, shortened from 27 days in 1568 to 14 in 1900, has been halved in the past 12 years, with an increase in our exports to Peru. While the Panama Canal will shorten the voyage from the United States, it will also shorten the distance to Europe and care must be taken not to flood this market beyond the needs of its people.

KNITTING.

INFLUENCE OF TWIST ON YARN.

Contributed exclusively to COTTON.

BY WILLIAM DAVIS, M. A.

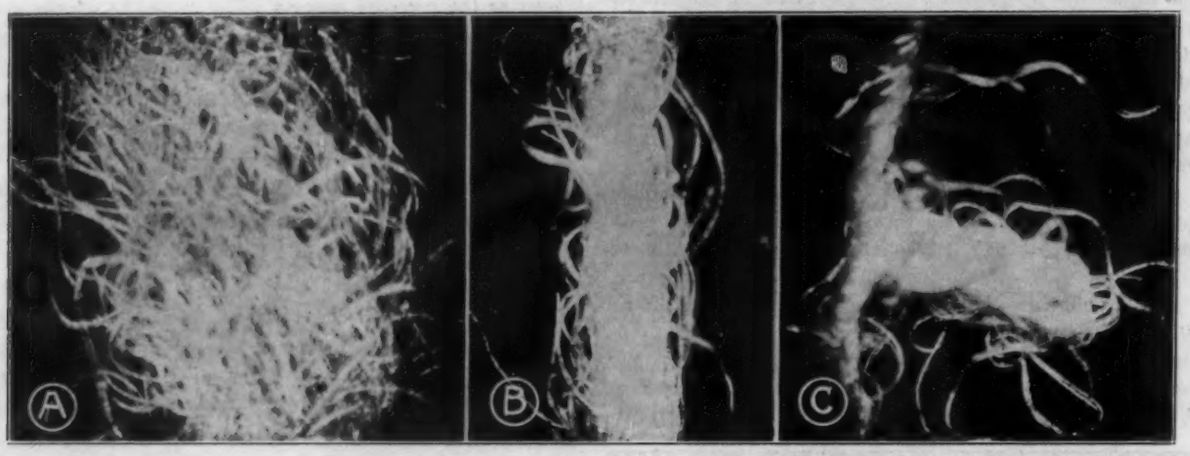
The practical man frequently complains that comparatively little of technical and scientific training can be directly applied to every-day requirements in the mill. He can frequently show cause for this complaint, but as often as not, he is unwilling to accept experimental methods in any shape or form and closes his mind to them. If we take the subject of this article as an example, the twist imparted to single and two-fold threads, the determination of the correct twist is generally the result of experience which undeniably, through time, becomes very reliable. Yet all are aware that rule of thumb methods combined with guesswork constitute the practice in too many manufacturing concerns. In a case which came under the writer's notice recently, the twist to be imparted to a certain type of yarn was determined by giving at first an excessive twist by hand and then holding it up until it untwisted itself to its natural fold. The twist present after this operation was taken as the correct amount for the thread.

The objection generally advanced against experiments carried out on a variety of threads is that they must vary in the quality of material and in the mode of treatment in the different processes, and the matter is allowed to rest there. Making due allowance for such variations, we shall endeavor to show that much general information regarding torsion may be gathered from careful and systematic experiments. Further, although it is not possible to arrive at general results which will apply for every class of yarn, yet accurate information regarding the individual classes may be acquired.

When the material has passed through the carding and condensing and is drawn ready for the application of twist in spinning it appears loose and soft, ready to fall apart when the least strain is applied. In such form it proves entirely unsuited for practical manufacture and torsion is applied by rapid revolutions of the spindle on the spinning frame.

EFFECTS OF TWIST.

In twisting, the fibers are drawn into closer contact with each other and are made to have a firmer grip on each other in the twining process. Thus the fibers which previously had little surface attraction are now bound together. The diameter of the yarn gradually decreases as the twist increases, the fibers being drawn tighter and tighter until they begin to rupture under the effect of extreme torsion. At the point of excessive twist, the yarn exhibits a marked tendency to twist back on itself when tension is removed from the yarn. These go under the general name of "pirls" and frequently appear on threads where the twist may not be regarded as excessive, but necessary for practical purposes. The remedy in such cases is to place the yarn for a few minutes into a box through which a strong current of steam can be passed. The steam softens the fiber and renders it plastic so that it soon adapts itself to its new position. The three stages just enumerated are graphically set forth in Fig. 1 in the photo-micrographs A, B and C. Fig. A represents the yarn as it appears in the last operation before spinning, where the amount of torsion is very limited. The fibers are loose and a slight pull tells us that such a yarn would fare badly in the loom or frame. Fig. B shows exactly the same yarn with what may be termed a normal twist put on. Comparing B with Fig. A one can notice that the twist has reduced the diameter to about one-third of the original and the thread has been rendered very dense in structure. Fig. C shows the same yarn when it has reached the point of "excessive torsion." The thread has now been reduced to about one-sixth of its original diameter and exhibits one of the "pirls" just referred to, that is the thread has twisted about two turns upon itself. When those "pirls" or "snarls" reach the loom, the beating up of the weft draws them out, and slack threads appear in the fabric.



A REPRESENTS YARN BEFORE SPINNING. B SHOWS SAME YARN WITH NORMAL TWIST. C SHOWS SAME YARN WITH EXCESSIVE TWIST.

The amount of twist present on the yarn has far-reaching effects in the cloth. The elementary requirements of weaving and knitting demand that the amount of twist shall be sufficient to give enough strength and stretch for the thread to pass successfully through the manufacturing machine processes. There may be sufficient tensile strength, but if the elasticity proves insufficient, much of the strength

may be of no avail. In other words, the yarn would possess strength combined with brittleness. On the other hand, the manufacturer is confronted with the requirements of the trade with regard to the handle of his fabrics. Increase of twist renders the thread hard, and the production of a soft handle is not possible except by artificial methods.

If the fabric is one in which much milling is required, the best results cannot be obtained from a hard twist, hence the fibers are not free to interlock as in the case with a softer twine. Increase of twist means decreased surface fiber so that the depth of coloring required for some cloths cannot be realized. To overcome these difficulties, manufacturers use for many classes of goods a softer twine for filling yarns. It becomes possible to do this, because all the strain to be borne by the filling is that of coming off the spool through the eye of the shuttle which is tensioned to a small extent. As a result, a yarn possessing much less twine or twist and consequently with a softer handle, can be employed for filling. A thread bearing only half the tensile strain of a corresponding warp thread is generally sufficient to fulfill this requirement.

As is clearly demonstrated by the following experiments, each yarn increases its strength with the increase of twist up to a certain point, termed the point of maximum strain. This point reached, the strain remains practically stationary during the application of more twist until a point is reached which renders further twine impossible owing to the "snarling" and the internal rupture of the fibers of the yarn. It is to the "stationary" period that the manufacturer must turn when he wishes to get a specific result in the handle of cloth, for he knows that to increase the twist beyond the point of maximum strain does not increase the strength and wearing qualities of the fabric.

EXPERIMENTAL EVIDENCE AND PROOF.

A variety of woolen carded yarns were received from the manufacturer in the state in which they were spun. A certain length of yarn was not twined on a twisting machine, the first test being made with two turns of twist per inch. Another length was taken and four turns per inch put on it, and so on, the twist for each experiment was increased by two turns per inch until the breaking point of excessive twist was reached. Each of those threads were taken in turn and tested on the newest type of single thread testing apparatus, the average of three tests being taken as the standard tensile strength and stretch for that degree of twist. The length of yarn tested on each occasion was 12 inches, the strain was recorded in ounces, and the stretch in inches and sixteenths thereof.

Example 1. The first test is that of a single woolen yarn 14 cut or equivalent to 1¾ run, and the following table gives the exact results:

Test No.	Turns per in. of twist	Average breaking strain or strength of yarn	Average stretch
1	2	4 ozs.	14/16 inch
2	4	11¼ ozs.	1 4/16 inches
3	6	17 ozs.	1 6/16 inches
4	8	19 ozs.	1 12/16 inches
5	10	21 ozs.	2 2/16 inches
6	12	16⅔ ozs.	1 10/16 inches
7	14	16 ozs.	1 7/16 inches
8	16	16⅔ ozs.	1 10/16 inches
	18 turns impossible.		

For this particular yarn, therefore, we would at once

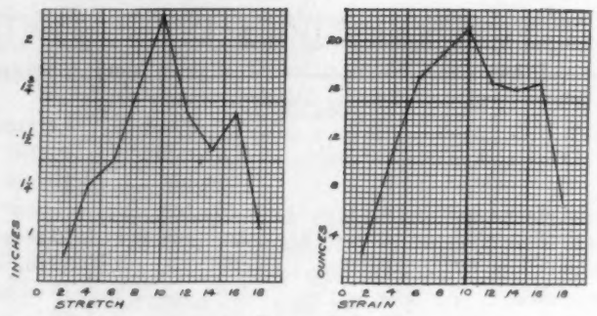


PLATE I.

determine a torsion of 10 turns per inch as the point of maximum strength. We further note that the increase of strength is most rapid when the first tests of 2, 4 and 6 turns per inch were made, an increase of two turns causing an enormous increase in strength. Towards the point of maximum strength the increase is not so pronounced, but very steady. After the maximum strength point of 10 turns per inch, there is a sudden decrease, after which the qualities remain practically unchanged. What has just been stated can be demonstrated with greater lucidness on referring to Plate 1, which has been constructed to the exact particulars of the above table. The horizontal squares are set off to represent turns per inch from 2 to 18, and the vertical squares to represent the ounces breaking strain. The section devoted to stretch has its squares set out in inches in a vertical direction. The form of the line clearly shows the stage of rapid increase from 2 to 6 turns, the steady rise from 6 to 10 turns and the subsequent stationary period from 12 to 18 turns per inch.

Comparing the strength and stretch curves we gather that the one is practically the image of the other. Frequently during the "stationary" period, the yarn begins to exhibit an abnormal tendency to take-up length due to excessive twist. This, however, cannot be said to show in-

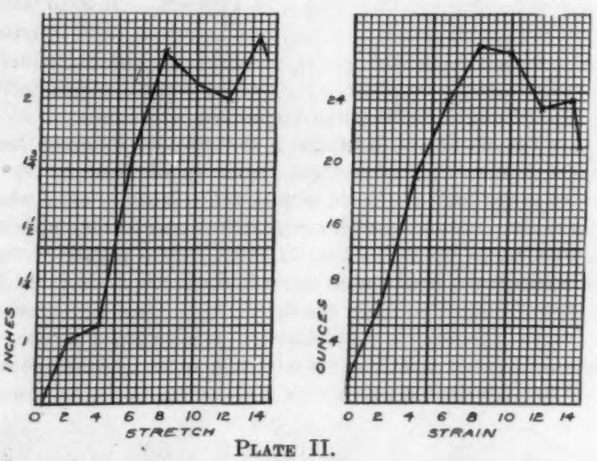


PLATE II.

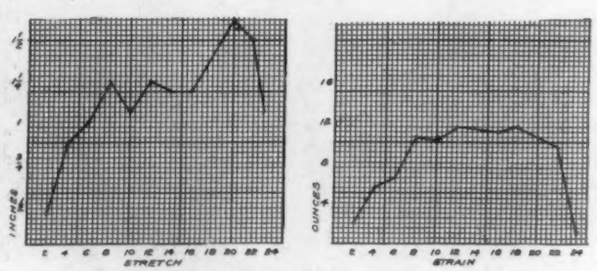


PLATE III.

creased stretch; it is merely a straightening out of the thread under the increasing tension.

Example 2. The next test is of finer count, a woolen yarn 17 cut equivalent to 2⅛ run.

Test No.	Turns per inch	Average strength	Average stretch
1	0	1⅔ ozs.	2/16 inch
2	2	6⅞ ozs.	1 inch
3	4	14 ozs.	1 1/16 inches
4	6	20 ozs.	1 13/16 inches
5	8	23⅔ ozs.	2 3/16 inches
6	10	22 ozs.	2 1/16 inches
7	12	19⅔ ozs.	2 inches
8	14	20 ozs.	2 5/16 inches
9	16 turns impossible.		

The test was begun with no twist on the yarn and the stretch on two turns per inch is seen to increase from 1⅔ to 6⅞ ounces, on four turns it has increased to 14 ounces, a remarkable demonstration of the effect of twist on a thread. The figures are shown in the strength and stretch diagrams of Plate 2, the line gradually goes up until the point 23⅔ ounces is reached at eight turns per inch, which constitutes the point of maximum strain, from there up to the point of excessive twist, the strength is either stationary or decreasing. In the yarn the breaking point was found when a twist of 16 turns was reached.

Example 3. A finer count was next taken with a number of 26 cut or 3¼ run.

Test No.	Turns per inch	Average strength	Average stretch
1	2	2 ozs.	3/16 inch
2	4	5 4/8 ozs.	14/16 inch
3	6	6 6/8 ozs.	1 inch
4	8	10 6/8 ozs.	1 4/16 inches
5	10	10⅜ ozs.	1 1/16 inches
6	12	11⅜ ozs.	1 4/16 inches
7	14	11⅛ ozs.	1 3/16 inches
8	16	11 ozs.	1 3/16 inches
9	20	11⅜ ozs.	1 10/16 inches
10	22	9 4/8 ozs.	1 8/16 inches
	24 turns impossible.		

The results of Example 3 show rather different from the first two. The strength gradually increases up to 12 turns per inch, the point of maximum strength, after which the strength and stretch are practically stationary over the long range of from 12 to 22 turns. As a matter of fact, although the breaking or impossible point is not reached before 24 turns per inch, the thread from about 18 turns upwards proved quite unsuitable for practical purposes of weaving. It was cramped and uneven in appearance and "pirly" to such a degree that it would be unwise to attempt to remove the snarls by steaming. Plate 3 bears out these figures very clearly.

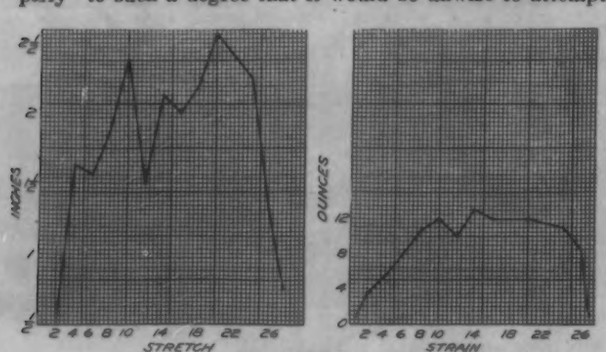


PLATE IV.

Example 4. The last example is that of 34 cut or 4¼ run woolen yarn.

Test No.	Turns per inch	Average strength	Average stretch
1	2	3 2/8 ozs.	8/16 inches
2	4	5 3/8 ozs.	1 10/16 inches
3	6	8 ozs.	1 9/16 inches
4	8	10 6/8 ozs.	1 14/16 inches
5	10	12 ozs.	2 1/16 inches
6	12	10 ozs.	1 8/16 inches
7	14	13 ozs.	2 2/16 inches
8	16	12 ozs.	2 inches
9	18	12 ozs.	2 3/16 inches
10	20	12 ozs.	2 9/16 inches
11	24	11 ozs.	2 4/16 inches
12	26	8 2/3 ozs.	1 5/16 inches
13	28 Impossible		

These results are shown in Plate 4. It will be noted that the point of maximum strength was reached with 14 turns of twist and that from this point to 24 turns the strength was practically stationary.

(To be continued.)

Turkey annually consumes about $50,000,000 worth of imported cotton goods and cotton yarn, coming from practically every manufacturing nation, including Japan. American direct exports of cotton goods to Turkey during the five fiscal years ended June 30, 1911, amounted to the following sums: $249,453, $164,999, $288,735, $272,310, $335,327. The classes of cotton goods sold in Turkey, in the order of their importance, are: Prints, gray goods, bleached goods, and colored or yarn-dyed goods. Prints include the ordinary shirting prints, printed flannels, and barchent, the latter being printed on one side and napped on the other.

In gray goods the demand is for a heavily sized product weighing about 2.5 to 3 yards per pound in the 32-inch width, which is the most popular. All widths, from 30 to 50 inches, can be sold, however. The dealers prefer the goods put up in pieces of 33 meters, or 36 yards, but with 40 laps or folds. A wide variety of bleached goods are sold, from the coarsest sheeting up to fine muslin and madapollams. In general they follow the same widths as gray goods. The finish is important, a soft linen finish being preferred. In prints, goods 27 to 29 inches wide are the most popular. A quality selling for 6 to 7 cents per yard is in great demand. The design in vogue there should be furnished and these are not nearly so conservative as those sold in America. The principal variety of yarn-dyed goods sold is the so-called "toile de vichy," which is known in this country as gingham. This is usually 36 inches wide and comes in various qualities, selling at 7½ to 10 cents per yard in Constantinople.

The total cost of materials in the hosiery and knit goods industry of this country for the year 1909 was $110,241,053, of which the cost of cotton and cotton yarns represented 51.7 per cent.

The best place to save coal is in the boiler room

DYEING, BLEACHING AND FINISHING.

THE PERMANENT FIREPROOFING OF COTTON GOODS.

BY WILLIAM HENRY PERKIN.

The Eighth International Congress of Applied Chemistry held its sessions in New York City, September 6 to 13. A large number of distinguished chemists from all quarters of the globe attended the meetings. There were several important papers presented of special interest to the Textile Industry. Among these was a general lecture given by Dr. William Perkin, of Manchester, England, on the "Permanent Fireproofing of Cotton Goods." Dr. Perkin is a son of Sir William Henry Perkin, the discoverer of the first coal-tar dyestuff. Dr. Perkin said, in part:

Among the problems of technical interest which I have worked at during many years are the manufacture of artificial camphor, of "synthetic" rubber and more particularly the permanent fireproofing of cotton goods and other inflammable materials. The problem of prevention of fire has always been one of the most pressing and at the same time one of the most difficult and perplexing with which mankind has had to deal. In very early times wooden houses caught fire and were burnt down and it is said that the Romans attempted to render wood fireproof by dipping it in a bath made of vinegar and powdered clay.

This treatment, so strongly reminiscent of processes employed many years afterward, would no doubt be effective in rendering the wood less liable to inflame, but it can hardly have had wide application because vinegar, in those days, was not easily obtained in quantity and was consequently an expensive substance. I have made a search in a number of old books with the object of discovering some other of the actual methods used in early times in connection with fireproofing and the first pamphlet on the subject which I have been able to find, dates from 1638 when Nikolas Sabattini published a remarkable paper in which he discussed the need of reform in the administration and construction of the theaters in Italy, and pointed out the danger, which is always present, of fire breaking out on the stage, not only owing to the inflammable nature of the wood employed in the construction of the theater and for the decorations and scenery, but also on account of the inflammability of the cotton material used in the scenery and for the dresses of the players.

At a considerably later date—in 1735—Wild suggested a mixture of alum, borax and sulphuric acid for the same purpose and, in 1740, Fagot, in a paper read before the Academy in Stockholm, recommended a mixture of alum and green vitrol whereas, in the Dictionnaire del'Industrie published in the year 1786, there is a paragraph in which it is stated that a mixture of alum, green vitriol and salt is effective in making wood and other material fireproof.

After the disastrous fire in Munich on the 14th of January, 1823, which completely destroyed the Hof and National Theater, a large number of experiments were made with the result that the wood used in the construction of the roof and other parts of the new theater, was painted with several coats of sodium silicate and chalk.

A coating of this kind lasts for many years and, although it does not render the wood absolutely non-inflammable, it has at least this value that the incipient fire, which as a rule begins in quite a small way, meets with resistance at the outset, progresses but slowly and is easily extinguished.

At a somewhat later date, it was discovered that wood saturated with other salts such as for example, copper sulphate or ammonium phosphate, acquires the property of resisting flame, but of all the salts, zinc chloride seems to be the most efficient for this purpose.

In the first place, zinc chloride has great affinity for, and, therefore, attaches itself readily to, woody fiber, and fibers of all kinds and material saturated with a solution of this salt and then dried, are practically non-inflammable. This salt has also this valuable property that it is a powerful antiseptic and therefore very suitable for fireproofing the wood used in the construction of hospitals and other public institutions of a similar nature.

But I do not propose to address you at any length on the subject of the fireproofing of wood and other building materials. What I wish to discuss is the problem of permanent fireproofing of wearing materials and especially of cotton and cotton goods and by permanent fireproofing I mean protection which is not removed when the materials are subjected to the ordinary domestic wash.

Many disastrous accidents are on record which have been brought about by clothing catching fire; sometimes it is the case of a child whose garments have come in contact with a spark or lighted match and sometimes disasters of much greater magnitude have resulted from the ignition of costumes made of tow or other inflammable material on the occasion of charity entertainments or fancy dress balls.

It has long been recognized that impregnation with certain salts very much reduces and indeed may entirely destroy the liability of cotton goods to inflame and, of these fireproofing agents, I may perhaps be allowed to refer to a few only of the better known and more efficient. If a garment, after washing in the ordinary way, is rinsed in a solution containing alum or is starched with a starch containing a proportion of alum, the material, after drying, shows a marked reluctance to ignite, but this treatment has many draw-backs. In the first place it makes the material very dusty, and secondary, the fireproofing is only of a temporary nature since it is at once removed by contact with water and the process must therefore be repeated every time the goods are washed. Another solution which has been strongly recommended for the same purpose is made up with 3 parts of ammonium phosphate, 2 parts of ammonium chloride and 1 part of ammonium sulphate in about 40 parts of water. If the material after washing, is impregnated with his solution and dried, or if it is starched with starch made with the solution instead of with water, the dry material only ignites with difficulty, and, as it does not dust and is not prejudicially affected in any other way, this process has been used with advantage not only in connection with wearing material, but also for the fireproofing of lace curtains and other inflammable decorations. But in this case also, the fireproofing agents employed are all soluble in water and one washing is sufficient to remove them entirely, leaving the goods at least as inflammable as before. The process must therefore be repeated every time the goods are washed and this means expense which, in the long run, becomes considerable.

But a much more serious drawback to processes of this kind is the trouble they entail since, in order to fireproof the garment the washerwoman must have alongside the ordinary wash tub, a second tub containing the fireproof solution and this complication, added to the expense of the salts, has been shown to be so serious that processes of this kind are quite impracticable, especially in the homes of the poor. Again unless the materials or garments after washing have been dried before immersion in the fireproofing solution, this solution cannot be kept uniform since, each garment being wet when put in leaves the solution weaker than before and therefore of less protective value. To dry each garment between the washing and the fireproofing entails so much trouble and labour and expense that it would obviously prevent any general adoption of the practice. Although the substances I have mentioned and the salts of ammonium in particular, possess in a high degree the property of rendering material fireproof, there is one substance which confers the property of resisting fire to cotton goods in such a remarkable degree that it has long attracted attention and must be specially mentioned, and that is sodium tungstate.

A piece of muslin soaked in a weak solution of sodium tungstate and then dried is practically non-inflammable but unfortunately this salt is again so excessively soluble in water that a mere rinsing in clean water is sufficient to remove it completely and the fireproofing is lost. And this applies not only to sodium tungstate but also to all the other salts which have, from time to time, been recommended for fireproofing purposes; the result is not permanent because the proofing is at once removed when the goods are washed in the ordinary way.

The problem on which I was engaged for several years and which has now been successfully solved, in a very simple manner, was that of attempting to discover some process which not only made the goods non-inflammable but also *permanently* non-inflammable, and the researches on this subject were originally started in connection with flannelette, a material very largely and widely used for clothing especially by the poorer classes, and one of the most, if not the most, inflammable of all cotton goods.

Flannelette may be briefly described as a kind of colico the surface of one or both sides of which has been "carded" or "raised" into a nap, the result being that the surface of the calico becomes covered with a fluff of minute fibers somewhat resembling a thin layer of cotton wool. This effect is produced by subjecting the surface of the calico to the action of a series of revolving rollers covered with a vast number of small pieces of sharp steel wire, which tear up the surface, and the material is passed over these rollers over and over again until the required amount of nap has been raised. The result of this superficial covering of nap is—as everybody who has handled flannelette will know—a warm, pleasant and cosy feel and this is no doubt due to a covering of air being imprisoned by the minute fibers thus producing a layer which acts as a non-conductor much in the same way as in the case of flannel.

Flannelette is indeed little, if at all, inferior to flannel as a non-conducting material and as it is very cheap and does not shrink in the wash, it has become very popular and is manufactured in enormous quantities and almost universally used for the clothing of children especially in the homes of the poorer classes.

But it was not long before its increasing use showed unmistakably that it has one terrible draw-back—the nap, which is its peculiar feature, makes it highly inflammable and much more so than the calico from which it was manufactured.

Flannelette is in fact, as I have already said, very much like calico on the surface of which a thin layer of cotton wool has been spread and this layer is, of course, highly inflammable. I can easily demonstrate the difference in the inflammability of calico and flannelette by applying a light to strips of each when it will be seen that while calico burns in the ordinary way, in the case of flannelette, the flame flashes over the whole surface of the fluffy cotton layer and travels with extraordinary rapidity.

It is this property which makes flannelette one of the most dangerous of materials for clothing purposes. The alarming frequency of deaths by burning due to the wearing of flannelette became common knowledge, the coroners all over Great Britain repeatedly called attention to the matter and by degrees the agitation against its use for clothing became so persistent that the Coroners' Committee of the Home Office was directed to enquire into the matter.

The committee recognized that whilst, to quote the words of their report, "We think the common opinion attributing to it (flannelette) a large share of the blame (of burning accidents) is not far wrong" that it was impossible to prohibit its use without causing great hardship especially to the poor. Several years before this enquiry was held, one of the largest firms of flannelette manufacturers in Manchester, becoming alarmed at the frequent occurence of fatal burning accidents and fearing lest these might lead to the prohibition of the sale of the material, came to me and asked whether I would undertake a series of experiments with the object of endeavouring to find a remedy for this state of things and, after looking carefully into the matter, I consented to do what I could. That the problem was a difficult one from many points of view will be readily understood if I briefly state the conditions which had to be kept constantly in mind while the experiments were being carried on. A process to be successful must in the first place not damage the feel or durability of the cloth or cause it to go damp, as so many chemicals do, and it must not make it dusty. It must not affect the colours or the design woven into the cloth or dyed or printed upon it; nothing (such as arsenic antimony, or lead), of a poisonous nature or in any way deleterious to the skin, may be used and the fireproofing must be permanent, that is to say it must not be removed even in the case of a garment which may possibly be washed fifty times or more. Furthermore, in order that it may have a wide application, the process must be cheap. What was really to be aimed at was to treat the flannelette in such a way that it acquired practically the properties of wool which, for all ordinary purposes may be taken as the standard of a safe material. Apart from the other conditions which I have laid down, when one considers the vigor with which the ordinary washerwoman scrubs garments with soap, not infrequently with the assistance of the scrubbing brush, and takes into account the wonderful mechanical appliances now so largely used for washing clothes with the least expenditure of time, it will not be thought surprising that the discovery of a process of fireproofing sufficiently permanent to resist these conditions seemed to me at first to be almost an impossibility.

In describing the course of the research, I may perhaps be allowed to give a brief sketch of the development of the subject and to outline the reasoning which led to the insti-

tution of the various experiments. Some idea of the difficulty of the subject will be gathered when I say that Samuel Bradbury, who so ably assisted me in the work and has kept a record of each experiment, tells me that upwards of 10,000 separate burning tests were made before the solution of the burning problem was reached. Besides these, a great number of further experiments have since been made to see whether an even cheaper process than that which has now been in commercial use for nearly 10 years could be discovered.

I suppose that everyone would agree that, at the outset of the experiments, the condition which seemed most difficult of realization was that of finding a substance which not only fireproofs but which during the process becomes so permanently fixed that it will prove to be absolutely resistant to washing with soap and water or mechanical rubbing. Obviously the substance which is to fulfill these conditions must, in the first place, be insoluble in water and secondly in order that it is not liable to be removed by mechanical rubbing and does not render the cloth dusty, it must be fixed in the fiber and not merely on the surface. I have already explained that when calico is dipped in a dilute solution of sodium tungstate, and then dried the material possesses in a remarkable degree the property of resisting flame and then again alum has often been recommended for the same purpose. Now when solutions of sodium tungstate and alum are mixed, an insoluble aluminum tungstate is produced and it is clear that, if this soluble salt could be fixed in the fiber, the material would cercertainly be fireproof. It furthermore seemed reasonable to suppose that, as the salt is insoluble in water, it would remain in the fiber even after several washings and therefore that permanent fireproofing might be achieved in this manner.

A piece of flannelette was therefore soaked in sodium tungstate and, after passing through rollers, to remove the excess of the solution, left for a considerable time in a solution of alum. It was then squeezed, dried and was passed through the same process again with the result that the material became almost as fire resistant as asbestos. When, however, the piece was thoroughly washed with soap and water, it was most disappointing to find that the greater part of the fireproofing was removed during the first washing and after several washings, the material was little better than the original flannelette.

While this unexpected result was being investigated, it was noticed that aluminum tungstate is soluble in acetic acid and is reprecipitated when the acetic acid is removed by evaporation or by the action of steam and as the precipitate formed seemed granular in appearance, it was thought that this process, if applied to the flannelette, might yield a better result than the process of double decomposition had done. Accordingly, a solution was made up of sodium tungstate, aluminum sulphate and enough acetic acid to dissolve the precipitate, the flannelette was thoroughly soaked in this solution, dried and then placed in an ordinary steamer and subjected to the action of steam until the odour of acetic acid could no longer be detected.

The material was, of course, non-inflammable and when it was washed, it was found that this property was distinctly more resistant to soap and water than was the case in the first experiment but after several vigorous washings almost every trace of fireproofing had disappeared. These negative results seemed therefore to indicate that aluminum tungstate was not suitable for the purpose of permanent fireproofing. On the other hand, the failure of this salt was possibly due to some peculiarities in its specific properties and was not considered valid evidence that other insoluble tungstates might not combine more completely with the fiber and thus resist removal by washing.

A careful examination of the tungstates was therefore made and such insoluble salts only selected for experiment which, like aluminum tungstate, are colourless since it is obvious that a fireproofing agent to be of any use must be capable of application to white cloth without staining it. Several hundred pieces of flannelette were treated under the most varied conditions with all sorts of combinations which it was known would precipitate insoluble tungstates in the fiber but in no case was a satisfactory result achieved.

However, a fact was noticed which afterwards proved to be of value and it was this that, of all the salts, the tungstates of zinc and tin seemed to offer the most resistance to washing with soap and water. Thus, when the material had been thoroughly saturated with a solution made up of sodium tungstate, zinc sulphate and enough acetic acid to prevent the precipitation of the zinc tungstate, and the goods after drying were thoroughly steamed, the fireproofing was certainly fixed to some extent since it required several washings before the material burnt at all freely. But no amount of variation of the conditions produced a really good result and this combination had therefore to be abandoned. Since the tungstate proved to be insuitable to the exacting conditions of the problem, a general examination of almost every variety of salt, including ferrocyanides, aluminates, arseniates, antimoniates, zincates and plumbates was made. Many of these could not be employed in connection with wearing apparel in any case because of their poisonous nature but it was thought that this general examination, which lasted several months, might yield some indication of the type of salt likely to prove resistant to soap and water, if, indeed, such type of salt existed at all. And as a matter of fact these experiments did prove to be the most valuable because when the results were all tabulated, the generalization gradually became apparent that certain soluble salts such as aluminates, antimoniates, zincates, and plumbates, in which the oxide of the metal functions as an acid, yielded precipitates especially with zinc and tin salts which exhibited much greater resistance to washing than the commoner insoluble salts such as barium sulphate or magnesium phosphate. This generalization ultimately led to a very careful examination of the salts of tin because, as is well known, the oxides of tin dissolve in alkalis to form stannites and stannates and tin therefore belongs to the class of salts just mentioned and it very soon became evident that these salts do actually possess the power of combining with the fiber to a greater extent than any of the salts which had previously been experimented with.

In one experiment it was noted that a piece of flannelette, which had first been saturated with a solution of sodium stannate and dried, afterwards similarly treated with a solution of zinc chloride, was quite non-inflammable. After the sample had been subjected to a vigorous washing with soap and water a considerable amount of fireproofing still remained because, when a light was applied to the cloth, it only ignited with difficulty, burned very slowly, and either went out of itself or was easily extinguished on shaking the material.

This development was so promising that the experiment was repeated in a great variety of ways but, although sev-

eral results were obtained which were much better than anything which had been seen before, it was disappointing to find that in all the cases the greater part of the fireproofing was lost after repeated washings.

In a later series of experiments the first solution was again sodium stannate and the second consisted of sodium tungstate, zinc acetate and sufficient acetic acid to prevent precipitation of the zinc tungstate formed. The result in this case was so good, the material being practically as safe as wool, even after repeated washings, that the first commercial permanently fireproofed flannelette which was placed on the market was made on these lines.

It was soon found, however, that the material thus treated had two serious draw-backs; it had a tendency to go damp, and an unpleasant smell of acetic acid remained even though the material had been steamed and washed, after the fireproofing process, before being sent out. And apart from these two faults, the fireproofing was still not sufficiently permanent and the cost of the process was too great for it to be considered a satisfactory one.

A further series of comparative tests seemed to indicate that the undoubted advance which had been made was mainly due to the use of the stannate, and it was therefore decided to carry out a series of experiments using salts of tin exclusively.

The fabric after being treated with sodium stannate as before, was, in the earlier of these experiments, passed through a fixing bath containing stannous chloride. A very permanent fireproofing was again obtained, but the stannous chloride being a reducing agent, tended to destroy or affect the colours of the material and the process would, therefore, be generally applicable only to white cloth.

In order to get over this difficulty stannic chloride was employed, instead of the stannous salt as the fixing agent, and to avoid any tendering of the material, care was taken that the stannic chloride solution should be of such a strength that a little stannate was left unchanged in the material.

An excellent fireproofing was again obtained, for not only did the material show very little tendency to inflame, after it had been washed several times with soap and water, but it had also in such other respects as appearance and feel almost ideal properties, the only objectionable feature being a slight tendency to dust on rubbing and shaking. Now in this particular experiment, in which sodium stannate and stannic chloride had been employed together, the substance which must have been produced in the fiber, and to which the fireproofing must therefore have been due, is stannic oxide and it seemed clear that this oxide or its hydrate must have some remarkable power of combining with, or attaching itself to, the fiber which enables it to resist removal by washing and rubbing.

But this process still left something to be desired on the score of economy. A certain amount of the tin was undoubtedly wasted, for, in addition to that lost through a portion of the stannate being left unfixed, it was noticed that a considerable amount of the tin oxide which was formed by the action of the alkali of the stannate on the stannic chloride, was not permanently fixed in the fibers of the material, and was therefore removed during the subsequent washing. Tin is so expensive that, in a process to be commercially successful, this loss must obviously be avoided.

There are many ways in which stannic oxide may be precipitated from sodium stannate and one of these, commonly used in ordinary analytical chemistry, consists in adding certain soluble salts such as sodium sulphate or ammonium nitrate to the solution of the stannate, when the whole of the tin is precipitated as oxide or hydrate. In order to find out whether some process of this kind would precipitate this oxide in such a condition that it would remain permanently fixed in the fiber, a number of pieces of flannelette were soaked in sodium stannate and, after thoroughly drying, separately passed through various solutions containing sodium or ammonium salts at the ordinary temperature and at temperatures up to the boiling point. Although, as was to be expected, the results were not uniformly good, a certain degree of permanent fireproofing was always achieved and consequently the matter was systematically followed up with the result that a process was gradually evolved which yielded material possessing quite remarkable properties. The process is briefly this:

The flannelette (or the material) is run through a solution of sodium stannate of approximately 45 degrees Tw. in such a manner that it becomes thoroughly impregnated. It is then squeezed to remove the excess of the solution, passed over heated copper drums in order to thoroughly dry it, after which it is run through a solution of ammonium sulphate of about 15 degrees Tw. and again squeezed and dried.

Apart from the precipitated stannic oxide, the material now contains sodium sulphate and this is removed by passage through water; the material is then dried and subjected to the ordinary processes of finishing. A long series of trials, carried out under the most stringent conditions, have conclusively proved that material, subjected to this process is permanently fireproofed. No amount of washing with hot soap and water will remove the fireproofing agent, or in other words, the property of resisting flame lasts so long as the material itself lasts. This extraordinary property of resisting soap and water seems to me to indicate that the oxide of tin is not present merely as an insoluble precipitate in the cloth, but must have entered into some actual combination with the fiber, yielding a compound which is not broken down by the action of the weak alkali of the soap. But a matter of hardly less importance from the practical point of view is that the material is not only permanently fireproofed by the process I have just described, it also retains and acquires properties which make it as perfect a material in all other respects as could be desired. In the first place the treatment has no effect on the delicate colours which are now so generally employed in connection with the manufacture of flannelette and other cotton goods and very careful experiments have demonstrated the fact that the insoluble tin compound in the fiber has not the slightest deleterious action on the most delicate skin. In addition, the presence of the tin compound in the pores gives the cloth a softer and fuller feel than that of the original flannelette and what perhaps is the most unexpected result is the fact that the material is considerably strengthened by the process.

A series of tests made by the Manchester Chamber of Commerce proved that the tensile strength of flannelette is increased nearly 20 per cent as the result of the introduction of the tin compound into the fiber.

Further and very exhaustive tests made at the Municipal School of Technology, Manchester, on a machine specially designed for testing the wearing properties of fabrics, showed an even greater gain in durability in the case of the

fireproofed flannelette. These separate and independent tests conclusively showed tnat the increase in strength and durability was approximately equal to the cost of the fireproofing treatment so that garments made from the permanently fireproofed flannelette are as a matter of fact no dearer than those made from ordinary flannelette and are at the same time as safe as if made from flannel.

This permanently fireproofed flannelette is now manufactured on the large scale in Manchester under the name of "Non-Flam" and, although its introduction has been slow, it is being increasingly used and will, in all probability, ultimately entirely replace the ordinary inflammable variety. One of the difficulties experienced in connection with its general introduction is the fact, that, owing to the high price of tin, which is now quoted at about $1,050 per ton, the cost of process is not inconsiderable but, even with tin at this high price, the extra cost is not more than 2 cents per yard, or about 3 or 4 cents for a child's garment.

It is hardly necessary for me to say that this process can be applied to any cotton fabric and is especially valuable in connection with muslin because this material is so often used, especially on the stage, for dresses which, on account of their flimsy nature, are naturally highly inflammable. Another direction in which the process may be used with great advantage is in connection with lace curtains. Many disastrous fires have occurred by reason of the ignition of lace curtains, and there can be no doubt that the greater majority of these would have been avoided if the curtain had been treated by the "Non-Flam" process. because even supposing the material did catch fire, the flame is put out at once by the least shake.

It is obvious that, if this process or some other process capable of giving the same protection from fire, was adopted in the case of all inflammable cotton goods and especially in the case of material used for garments, many disastrous fires and the appalling loss of life especially among young children, might be avoided.

Practical Problems Discussed by Cotton's Readers

We invite our readers to make use of this department for the discussion of any and all problems arising in the mill or the finishing plant. Questions, answers or letters need not conform to any particular style and will be properly edited before publishing. The editors do not hold themselves responsible for any statements of opinion or fact which may appear in this department unless so indorsed. This department is open to all.

THE REASON WHY.

BY Y. L. Y. GEORGIA.

EDITOR COTTON:

I have noted for some time a discussion going on concerning the question "Why?" that was propounded by "W. B. W." I respectfully submit the following thoughts and hope that they will be of interest to your many readers.

First, I will say that the more twist that is inserted in the roving the smaller the strand will be.

Second, the smaller the strand, the lay gear not being molested, the wider apart the coils of roving will lay on the bobbins upon which it is wound.

Now, taking up the roll question, I am under the impression that a certain section of the steel roll, had at its neck, become worn so much that it had a tendency to slip, but not enough to cause the ends on that respective section to come down. That the loose section of the roll slipped gradually and not with a jerky motion, but that the end of the roll did slip enough so that it did not average up to the constant speed of that section that was in good condition and running up to its regular speed.

With the stated condition I think all will agree that more twist was being inserted in the roving that was on the loose end of the steel roll, owing to the fact that its speed was not constantly up to the regular speed at which the tight end of the roll was driven.

The twist is inserted in the roving by the flyer, between the flyer and the grip of the front roll, and in this particular case, the speed of the spindles and flyers being up to the regulations, the loose end of the steel roll being retarded gives the flyers and spindles more revolutions to the amount of roving bing delivered by the loose end of the roll than would be the case normally. The slower the roll revolves, the more time is given to the flyers, which of course gives more revolutions to the spindles in proportion to the amount of roving being delivered by the loose end of the roll more twist in the roving than the average per inch of the roving that is delivered by the tight section of the roll that is running up to its speed.

All are aware of the fact that more twist being inserted in the portion of the roving mentioned above naturally makes the strands smaller in diameter, and this being the case, (the lay gear not being molested as it lays the roving correctly on that portion of the machine that is in good condition), the roving coils are wider apart than on the bobbins upon which they are placed.

As the carriage of the machine goes on its upward stroke it places the layers wider apart on the bobbin. When it comes down on its downward stroke, it places the next layer of coils between the layer of coils of the preceding stroke, thereby reducing the diameter of the bobbins all along through the build. This, together with the reduction in the diameter of the strands due to more twist being inserted, causes the bobbins to be reduced in diameter and made smaller than the bobbins on the other section of the roll which is running up to its speed.

This of course causes the ends to run slack on the respective bobbins fed by the loose end of the roller, for the smaller the bobbins the slacker the ends will run if the tension gear is not regulated to give tension to the roving to the extent of making the slack ends run tight. However, the tension gear cannot be changed to tighten up the ends that are running slack on the section of the roll that is loose, as it will cause the other ends on the tight section to run too tightly and thereby cause stretch and trouble with uneven yarn, etc.

Briefly, my solution is: More twist being inserted, caused by retarded speed, which in turn reduces the diameter of the strands of roving, causing the diameter of the bobbins to be smaller in build throughout; the tension gear not being molested and the lay gear not being changed. This is the reason "Why."

ANOTHER ANSWER FOR "W. B. W."

BY NEMO.

EDITOR COTTON:

In COTTON for the month of October, your correspondent "W. B. W." is still asking for the cause of the sliver running slack. He says he has adjusted the remedy, but still wants to know *why*. The simple reason of its being stretched through the roller not starting promptly is sufficient to cause the ends to run slack. They could be stretched, but not enough to cause them to break. By being thus stretched, the sliver would be finer and therefore would build more slowly and require more twist than the others not stretched, but would only have the same twist and speed as the others.

WHY THE SOFT BOBBIN?

BY A. C.

EDITOR COTTON:

A fine speeder tender, wrapped the roving once around the presser instead of twice. A very soft bobbin was the result. I will be glad to have your correspondents in the practical discussion department explain the cause of this soft bobbin. I cannot see why the twist should be less, as the front roll and the spindle make the same speed as with twice around the presser. I trust I shall receive some interesting replies from your carder readers.

IS IT "FACTOR" OR "MULTIPLIER?"

BY H. E. W.

EDITOR COTTON:

I was very glad to note in the October issue that Mr. Parker replied to my criticisms of the terms he uses in his writings and the one point that I will try to make still plainer, is that of the twist factor. I don't see how your correspondent can call the twist factor and the twist constant the same thing by substituting one for the other. He says general usage has made it proper to use either term, but general usage of things does not always make them proper.

Your correspondent goes on to say in regard to the twist multiple or multiplier, that the latter is preferable and more accurate. He says the twist per inch is always the product of the square root of the counts of the yarn and the twist multiplier. In multiplication two factors are given to find the product. And in division the product and one of the factors are given to find the other factor. For example, we have $\sqrt{25} = 5$ the one known factor, and the 23.75 turns per inch (the product), and by the process of division $23.75 \div 5$ we get 4.75 the other factor or *twist factor*.

This does not become a multiplier until we go into multiplication, and not always then, for we might come back to your correspondent's "general usage" of things again. Let us take up multiplication. In multiplication we have what are known as the multiplicand, multiplier and product. For example, $\sqrt{25} = 5 \times 4.75 = 23.75$. 5 might be the multiplicand and 4.75 the multiplier, or *vice versa*, 4.75 might be called the multiplicand and 5 the multiplier; in either case the product is, of course, the same. I don't think that many persons, in the process of multiplication, would use the first or longer way where three numbers would be produced and then added together to get the product, but would use the second or shorter process. That would necessarily change the multiplier into the multiplicand.

I still think that the proper term to be asked for in relation to twist would be *twist factor*. Since we have the one known factor $\sqrt{25}$, which is 5, and the product, the twist, which is 23.75 turns; it is the unknown factor we want, and it is obtained by dividing 23.75 by 5, which gives the other factor 4.75.

The total production of yarn in the cotton mills of the United States for the year of 1909 amounted to 2,040,290,743 pounds, of which 470,370,995 pounds, valued at $109,314,953, were made for sale.

A large foreign import and export house informs an American consulate that it wishes a complete range of samples of cotton canvas, with prices c. i. f. city of destination. The canvas required is chiefly for the making of tarpaulins and tents. In writing to the Bureau of Foreign and Domestic Commerce, Washington, D. C., refer to No. 9736.

THE DUTIES OF A MASTER MECHANIC.

BY MASTER MECHANIC.

EDITOR COTTON:

In a recent issue of the *American Wool & Cotton Reporter*, is an article signed by "Textile Mill Engineer," who writes under the heading, "To Overdue Often Spoils." In this article he takes to task some former contributor to that paper who has been writing on "The Master Mechanic, and Mill Mechanics." My idea in writing this letter to you, is that as a Southern master mechanic, I believe that COTTON is the true medium to present our ideas in connection with the position of master mechanics in textile plants. It is quite evident to any reader that both of these contributors were writing largely of Northern conditions, particularly so in the case of the person who signs himself "Textile Mill Engineer." Whether he is an operating engineer or a constructing engineer he fails to differentiate, but perhaps it makes little difference in the end which position he holds. His sarcastic allusions to the master mechanic aspiring to the position of agent, as well as architect or mill engineer, would naturally lead one to believe that his title of engineer came down through the constructive class and his remarks were therefore largely caused by a slight attack of jealousy.

Not only did the former writer on the master mechanic cover the various points rather well, but in some respects he did not carry his details quite far enough. Here in the South, the master mechanic is, more often than otherwise, chief engineer as well as master mechanic. Also in many sections of the South, the master mechanic must be either an electrical engineer or else have sufficient electrical training to qualify him to act in that capacity on all ordinary occasions, and in all ordinary emergencies. By the word ordinary, in this case, I mean the usual or ordinary accidents or faults that may arise with electrical machinery and transmission, as against the occasional difficulties that sometimes

arise caused by electrical faults of an intricate technical character, that are not understood by any except thoroughly well versed students of electrical engineering.

Referring again to the first writer's group No. 16, which embodies construction, new mills, additions, and remodeling; a careful survey of textile plants in the South will indicate that there are very many plants where at least portions of this construction is put up to the master mechanic. I have in mind one place, where, before presenting a suggestion to the board of directors, the general manager always had the master mechanic figure on the cost of the proposed building or change and submit as far as possible detailed figures of such cost to the general manager, from which he could quote when making his suggestion to the directors. He was thus enabled to say with comparative definiteness, just what a certain change was going to cost and what the effect on the plant as a whole would be after the change had been made. It was in no sense a question of the master mechanic usurping the position of the agent or general manager, but merely a case of the general manager using the ability which he knew his master mechanic possessed, in cooperation with his own knowledge of after effects, to present the situation in its true light to the board of directors for discussion and confirmation. This is by no means an isolated instance, as I have personal knowledge of this same action being taken in plants widely separated in several Southern states.

Other additions to the master mechanic's line of work come about as naturally, as did the necessity for him to understand electrical machinery and apparatus when the electrical development of this section of the country first began to be appreciated by textile plants. In one instance I know of a master mechanic who had to oversee the digging of a number of drilled wells, varying in depth from 100 to 1,000 feet, and afterwards the shooting of these wells with various quantities of dynamite in an effort to obtain a further flow of water from them. A man of the caliber of "Textile Mill Engineer" might have balked at handling dynamite, but to the average practical master mechanic in the field, all such responsibility comes in as a day's work and he thinks nothing of it, but merely adds it to his list of acquired facts, which makes him that much more valuable to the man by whom he is employed.

A prominent New England cotton manufacturer, who was agent for several large mills in that section during his lifetime, and who was at one time president of the New England Cotton Manufacturers' Association, once told me that the agent, general manager, or superintendent, which ever had actual charge of the plant, always depended largely upon his master mechanic to act as a kind of assistant to himself and in many cases he was the one man in the whole plant on which absolute dependence could be placed for prompt and efficient service in any emergency. In other words, instead of working as employer and employe, they should go through their practical working existence shoulder to shoulder, each ready to bear the burden in case the other was absent. He led me to believe that the master mechanic should be an understudy to his employer, with an eye always keen for his employer's best interests and always willing to assume responsibility whenever it was necessary for him to do so.

That this is often the case I believe to be a fact. To sight one specific instance, when I had just engaged with a new plant, the superintendent came to me and said:

"Now, Mr. M., I want one thing understood between us. Whenever you have to be away from the plant to go to the city for supplies, or to the foundry for castings, or when you have to be away for any other purpose, I want always to know about it, so that I can be on the job while you are absent and be able to get in touch with you if necessary. Also, whenever I am going to be away, I will notify you, and I want you to make it a point to always stay with the plant until my return. In other words, I want either you or myself to always be on the job, and ready to take care of any emergency which may arise. There is no one else here who is familiar with all the details; with the location of fire plugs, valves, etc., and with the ability to keep a cool head in the time of emergency or accident except you and I, and therefore I want one of us within reach always."

The ability of the master mechanic to care for dams, spillways, canals, head gates, water wheels, and other features of a water-driven plant, or a hydro-electric plant is also necessary. He should not only have good judgment, but be quick to perceive the necessary salient facts that go with each section of the country in which he is operating. As an example of this, a master mechanic had charge of a certain plant in one of our Southern states where the light sandy top soil was underlayed with a clay subsoil, from which the water ran quickly. The plant of which he was in charge was driven partly by steam power and partly by water power. The dam was of earth construction with a sheet piling core wall, and a wooden spillway. Owing to the nature of the country, it was very necessary whenever a rain came, to immediately have the flashboards removed from the spillway in order to take care of the excess flow of water caused by this temporary downpour. He placed instructions with two reliable employes for one of them to always go to the dam at any time of the day or night whenever a rain occurred and remove the necessary flashboards. In case this first man had to be away for any cause, he was to at once notify the second man, and then he could look after the dam in case of rain. Whenever this work was done at night, the man doing it reported the time in the morning and received double time for the work he had done. When this master mechanic moved to a new position, the company secured a master mechanic from a New England state to take his place. This man, while entirely competent in many ways, lacked that perception of which I am speaking, necessary to see the nature of the land on which the plant was located. He believed that the time spent by these men at night and for which they had received double time, was so much good money thrown away, so he notified them that he would look after the dam himself in the future and they could let it alone. A few weeks after this there came a heavy rain one night and the master mechanic, used to New England conditions, and under the impression that morning would be in plenty of time to raise the flashboards, waited until morning, before which time the water overflowed the top of the dirt embankment and washed out about 125 feet of the dam itself.

In a smaller plant the master mechanic has many times to look after the yard gang and while in the larger plants he may have a yard overseer to work under him, he still issues general instructions as to the nature of the work he desires done and the yard foreman looks after that work. This also includes the upkeep of the mill village, streets, bridges, etc., in the immediate section of the mill, especially where the village is on mill property. This, despite the fact that "Textile Mill Engineer" states that very few mill cor-

porations of today own tenement property. If he will take a trip through the Southern states he will find that a very large majority of the mills in this section do own tenement property, and he will also find that one of the requirements of every master mechanic is to determine the best paint to use on these tenement houses both for appearance, protection of property, and cost. He will also find that nearly all the larger mills carry a tinsmith, and one or two masons, besides their equipment of carpenters and machinists. He will find that the watchman and the watchman's electrical time-clock is under the master mechanic, and it is up to him to keep both in proper working condition. A job that is frequently more difficult than it sounds, particularly in the case of the man. The elevators belong also to his equipment and in many cases he also does testing as regards to kinds of coal and oil it is best for him to use in the power plant and elsewhere.

The writer this letter refers to also ridicules the fact that the master mechanic's employes should be faithful to him, but if he had ever been a master mechanic in a plant of a fairly large size, he would at once see that the ridicule rebounds upon himself when he makes such a statement. These employes may not be "sworn into absolute loyalty" by the master mechanic, but if the master mechanic is an able man, you can bank on the fact that the men he employs swear by him and will stand up to him through thick and thin in any kind of an emergency. When he finds a man in his employ who goes and gets drunk during a critical period, the man never remains in his employ long afterwards. I have worked a large gang of men all day and all night on a repair job and sent them off one at a time as they could be spared from the job, so they might snatch a few hours sleep and be ready for work the next morning. and while as master mechanic I did not get one wink of sleep during the whole night, I knew that those faithful boys would be on hand in the morning and that I could have a chance to sleep while they looked after the running of the plant under the direction of the superintendent.

While the management may have men at the head of other departments in which they place trust for the management of those departments, as a rule those men are limited to the technical requirements of their position. When the boss dyer could not make his dye penetrate evenly on ribbed knit goods, and the outside of the rib would take the color evenly, while the inside when the fabric was stretched open would be light, did the boss dyer remedy his difficulty? No! The master mechanic was called upon to find some means to stretch those goods as they were passing through the dye liquor and thus make them take the dye evenly. The dyer prepared the color and matched the shade; he did nothing more. When a doubling machine caused a slight angular wrinkle in the cloth near the point of doubling, did the overseer of the finishing room indicate the cause? No! The master mechanic was called upon to find out why this wrinkle came there, what caused it and what was necessary to remove it. When an order came in for a sample lot of 5,000 yards of colored duck to be pasted onto the back of a like quantity of napped drill, it was the master mechanic with whom the superintendent consulted as to the building of a temporary machine, out of wood as far as possible and using spare parts from other machines, to make a temporary pasting machine that could handle this sample lot of goods at the least possible expense. When lots of goods came out of the kiers insufficiently boiled and did not bleach properly thereby, the kier boiler said the night fireman had let the steam get down below the specified pressure to sufficiently boil the kiers. It was up to the master mechanic to prove that the man in charge of the kier boiling had been asleep on his job and neglected to proptly attend to the kiers and that it was not the fault of the steam at all. The instances that could be sighted are innumerable, but they would probably in no way prove convincing to a "textile mill engineer," and therefore I will not unnecessarily occupy space by recounting them further.

If anyone can see the relation between the master mechanic's position and the I. W. W., which is undoubtedly the "Union" referred to by this "Textile Mill Engineer," they can see deeper into his article than I have been able to do. I am not an advocate of unionism by any means, but I cannot see where it is in any way related to the master mechanic or his position. Neither am I able to see where the position of master mechanic has been any time clothed in "pomp and purple robes," or as he says in another place referring to the master mechanic, his "pomp and glory." "Pomp and purple robes" sound well, but unfortunately in the present case mean very little. The purple robes of the master mechanic in the smaller plant, are usually blue denim overalls. In the larger plants the master mechanic can and often does aspire to the wearing of a high collar, which pleasure is his if he cares to assume it. Also he has a perfect right to keep his hands clean if he finds it available to do so and still carry on his work.

To the young master mechanic, who has read both the earlier article entitled "The Master Mechanic and Mill Mechanics," and this second article by "Textile Mill Engineer," I will say that the former article will give you very much higher ideals and it is much better for you to follow. Under no circumstances; under no set of conditions; in no plant on top of God's green earth, can you ever make yourself a *too valuable man*. When you get *too valuable* to stay in that plant, some other man will find it out and will be after you with an increased salary and an offer that you cannot afford to turn down. Do not be discouraged by the criticism and sarcastic slurs cast out by this latter writer, because he only sees the master mechanic's position from the viewpoint of a "textile mill engineer," and that is not the proper viewpoint from which it can be studied to the best advantage. Work to the advantage of the plant and its manager. Do everything that you are requested to do within the limit of your ability. Do not, under any consideration, if you ever hope to secure advancement, either with your present employer or with others, give him the reply to a request for information that you are not a "consulting engineer." You are a consulting engineer insofar as it is in your ability to answer his inquiries, compatible with practical mechanics and accurate up to your limitations. You must realize that you have limitations and in making a reply to an inquiry by the agent or general manager, be frank with him and show him just what you have done and just how much of it you are certain of. If there is a point about which you are in doubt, frankly say so. Your employer knows you are not a professional consulting engineer, but he does know that you are a keen, wide-awake, reliable man; otherwise he would not come to you with such a question, in the first place. He would at once look up some man who is, or at least, poses, under the title of "textile engineer." I would be very glad to hear from other master mechanics, both North and South, as to their opinions on this subject.

SOME QUESTIONS ON DRAFT.

BY BEGINNER.

EDITOR COTTON:

In changing the diameter of the middle and back drafting rolls on the spinning frame, why does it change the draft of the machine, that is between these respective rolls? I would like to have some of COTTON'S readers give me a complete explanation of this feature.

If it became necessary to change the diameter of the middle and back drafting roll as above, the specifications being back roll 7/8 of an inch in diameter and carrying a 25-tooth gear; middle roll being 3/4 of an inch in diameter and carrying a 20-tooth gear, and the draft between these two rolls 1.07. What gears would be required to produce a 1.07 draft if the diameter of the back roll should be changed to 1 inch and the diameter of the middle roll should be changed to 7/8 of an inch?

SOME OF THE FIBERS USED FOR MANUFACTURING PURPOSES.

BY A. A. D.

Fibers which are in general use in the textile trade may be divided into three classes, namely: vegetable, animal and mineral. Under the heading of vegetable fibers are cotton, flax, hemp, jute, and ramie or china grass. Wool and silk are in the animal class. Asbestos in the mineral class.

To distinguish one class from another the fibers or threads should be washed in a solution of hydrochloric acid, to free them from all impurities and dirt, then when dry apply a light, and if vegetable the fibers burn with a flame, and leave a white ash. If animal, they shrivel up quickly and leave a black ash. If mineral, they remain untouched. This method, although a simple one, is generally found useful, and does not take up a great amount of time.

Cotton fibers vary a great deal in regard to the length of their staple, some having a staple of nearly two inches, while others do not average one inch in length and it is generally found that cotton with the longest staple is the one with the least diameter, and of a fine, silky, irregular appearance. A good stapled yarn is necessary, together with smoothness, strength and elasticity to make a good quality of cloth.

If a small quantity of cotton is examined under a microscope, it will be seen that it consists of minute fibers, whose general appearance is that of spirally twisted bands, having thickened borders and irregular markings at intervals upon the surface. Or again, if looking at a cross section of some of the fibers, it would seem that some have flattened tubes, having comparatively thick walls and central openings, these are "fully ripe fibers" and the best to use to get good results.

There are also what are known as dead or unripe fibers in cotton and these generally give trouble in the dyeing process, as they refuse to take the dye in places, and form specks all along the yarn. This is especially seen in indigo-dyed yarns, so it is necessary to have fully ripe fibers to produce a good yarn for dyeing.

By steeping cotton in a strong solution of Caustic Soda, it becomes very lustrous and very much like silk in appearance, and when treated in this manner, the fibers become thickened and more round, they are then what is known as mercerized yarns.

Flax is a bast fiber and of a light brown color, and very strong. The fibers are hexagonal in section with knots at regular intervals in the length; the walls are also of a uniform thickness, and it is the best fiber known to commerce for bleaching purposes. It is a multicellular structure and is endowed with properties that cotton does not possess, therefore it must be regarded as a true fiber. Commercially, it is known as a linen fiber. The natural structure of this fiber facilitates both spinning and weaving. The fibers having an incumbent tendency when in the cloth, and this has much to do with the making of the finest and most durable fabrics that can be woven. The thread is also more useful than any other for the building of Jacquard harnesses.

Hemp, another bast fiber, is chiefly used for making rope, open canvas and upholstering cloths. This fiber is highly lustrous, smooth and even and has a silk-like finish, it is also stronger than flax, but coarser.

Ramie, or china grass, is also a bast fiber, and it is as pliable as cotton and nearly as lustrous as silk, besides being of great strength, and under the microscope the fiber appears as flattened tissue structure, with very delicate transverse markings, the faintness of the markings on the stems probably causes the fibers to be so highly polished and so tender in the bend.

When these fibers have undergone a bleaching process, the faint markings seem to be suppressed, and the luster shows up better. It will no doubt have a prominent place in the near future among the fibers used for manufacturing process, but the main difficulty at present is the removing of the fibers from the bark, or outer stems. It has a staple of from three to nine inches in length, and surpasses cotton in strength.

Jute is another fiber similar to ramie, and may be likened to gas or water pipes in appearance. The fibers are strong and owe their strength to the structural parts of tissue, and the glossy silky tissue of the cells which have become solid. It is chiefly used in the making of ropes, and twines of a common order, and also for linings for slippers and rugs.

Wool is a scaly fiber, and no other fiber varies to such an extent as wool in uniformity and firmness. It is fine, lustrous and silky, and also extremely soft and smooth to handle. A good specimen of wool fibers, when seen under the microscope, has well-developed scales, which overlap each other and are almost closed on the surface of the fiber, when the yolk or suint has been removed.

Two variaties of thread are obtained from wool, namely, woolens and worsteds, and they are chiefly used in the making of dress goods, carpet and knitted goods.

Silk is a fiber from larva or silk moth, and the fibers when seen under the microscope, have, on account of their transparency, been likened to a cylindrical glass rod. Silk is a consolidated flexible gum, and its value can hardly be overestimated in the textile industries. It is produced from two structures, one from each side of the body of the silk worm and is thus a twin fiber, with a groove between the parts. This groove structure is not visible to the naked eye, but can be seen when magnified.

The grooved structure probably imparts great strength to the fiber, but at any rate it allows the light to penetrate the body of the fiber, and shows up the many bright tints

and colors of the silk. The finest of fabrics are made from silk, and it is used a great deal in making dress goods, and also for ornamental purposes in other fabrics.

Asbestos being a mineral fiber, is indestructible, and is chiefly used in the making of fireproof doors, drop curtains for theaters and packing for pistons of steam engines.

While this does not cover all the fibers used for manufacturing purposes, still it will be found to treat to a useful extent on the principle fabrics in use at the present time.

The increase in the production of endless belts during the past ten years amounted to 191 per cent in quantity and 215.1 per cent in value.

Inquiries about anything pertaining to the textile industries will be cheerfully answered by COTTON.

An American consul in the Far East transmits the name of a firm which has been organized with a capital stock of $50,000 for the purpose of establishing a towel-weaving factory. It is proposed to start the factory with 100 looms. For further information apply to the Bureau of Foreign and Domestic Commerce, Washington, D. C. and refer to No. 9462.

The feature of the exports of cotton from Bombay during the year has been the greatly increased trade with Japan and China. Already there has been a demand in Japan alone for 736,339 bales, or 292,810 bales in excess of the requirements for last year on the same date.

The stock in the hands of mills, dealers, and exporters on May 16 was estimated to be 700,000 bales.

NEW MACHINERY AND TRADE NOTES.

THE A. H. WASHBURN CO.

Following the merging of the Saco-Pettee Company, of Biddeford, Me., and Newton Upper Falls, Mass., and the Lowell Machine Shops, of Lowell, Mass., A. H. Washburn, who has been in charge of the office of the first-named concern at Charlotte, N. C., has relinquished his position and will devote his time in the future to the organization and development of the A. H. Washburn Company.

The new A. H. Washburn Company has already secured a charter and proposes to conduct an extensive business in general machine work, erecting manufactories, building machinery, etc. Mr. Washburn will have his new offices on the eighth floor of the Realty building. His long experience in all lines of machinery and his wide knowledge of conditions in this territory will be invaluable to him and the new A. H. Washburn Company in the extension of its business, which already has a valuable start in the Southern territory.

THE MODOC CO., INC., of Fernwood, Pa., following the progressive tendency of the times, has recently concluded some extensive investigations in the field of sizings, soluble tallow and cotton softeners. They have called to their aid chemists of national reputation in research work along these lines, who have co-operated with their own chemists and practical men in an endeavor to produce a product which would give the most satisfactory results in each line. They make announcement to their many friends and customers that their improved products are giving surprisingly good results everywhere, which have more than warranted the expense incurred in their investigations. Their large new fireproof factory enables them to handle all orders promptly.

"The Even Hand," by Quincy Germaine. 276 pages. Illustrated. Price $1.20 net. Postage 15 cents. Published by The Pilgrim Press, 14 Beacon St., Boston, Mass.

This is a story of retributive justice. The story is set in a New England mill town. The principal characters are mill officials of an opposite type, one merciless and grasping and the other siding with the men. The lesson taught is that of fair dealing and consideration for others is often answered with much good will. For purpose of illustration the characters are admirably drawn. It is a well-known fact that men with a character similar to that given to the agent in the story, are seldom met with in successful textile mills today. The occasional exception to this well-known rule, however, is well exemplified by the author of this book. The story is full of interest and the fact that it is the first book of a new author and bids fair to be remarkably successful, leads us to expect future books of even greater promise. The lesson taught by the story is an excellent one and the book will make an acceptable and much appreciated holiday gift to any one interested in textile work.

THE FARBENFABRIKEN OF ELBERFIELD CO., 117 Hudson St., New York City, are sending to the trade the following color cards: Diazo Black 02G; Alizarine Geranole B; Sulphon Orange 5 G; Para Yellow 2 G; Rhodoline Blue 5 B; Paradurole; Diazo Fast Yellow 2 G; Benzoform Red G; Orange G, Brown R, Brown 4 R, Violet B, Blue B, and Bordeaux R. Copies of any of these color cards may be obtained by forwarding a request to the New York office of the company.

J. H. MAYES, Southern Agent for the Easton & Burnham Machine Co., and located at Charlotte, N. C., is sending out a recent catalogue of the Easton & Burnham machines, calling special attention to a new model bobbin spooler with a special bobbin holder. This bobbin holder is attached to a yoke made of iron which supports the bobbin trough in such a manner that the bobbin whether full or empty is brought into contact with the tension wire. This tension wire is free to move in a vertical direction. The holder is japanned so as to reduce the friction of the bobbin in its revolution in the trough and also that it may be easily kept clean. In operation the varying tension required is obtained, first, by the inclination of the holder to a horizontal plane, and second, by the rocking motion of the bobbin trough as well as by the vertical action of the tension wire. The latter, however, offers the greatest range of control. The new model spooler has been so arranged as to reduce the width to 43 inches over all, which permits the placing of these machines in line with spinning frames when desired. The back spindle is single-rail self-oiling. Creels and boxes are made of steel or wood as may be required.

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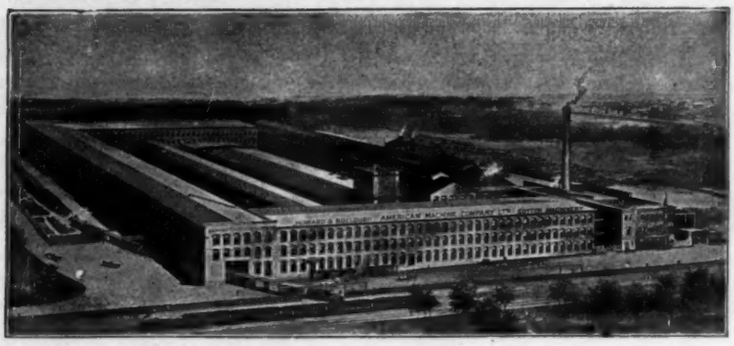

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WE INVITE YOUR INVESTIGATION AND COMPARISON

The September issue of *Cotton Chats* published by the DRAPER Co.. Hopedale, Mass., contains one of the most unique advertising features that has ever been brought to the writer's attention.

Forty-three years ago the original double spinning ring patent was granted to William T. Carroll. Double rings were introduced by the predecessors of the Draper Co. and rapidly replaced the single rings then used on spinning frames. Since that time improvements have been made in details of manufacture whereby rings of better and more uniform quality are secured. In 1907, they registered in the U. S. Patent Office the trade mark "Mirror," and their double rings have since been sold under this trade mark.

The "Mirror" spinning rings with the prestige of forty-three years of manufacture, have established the standard for quality, and in this issue of *Cotton Chats* above referred to, is shown a number of illustrations of one or more Mirror spinning rings arranged with two or more mirrors for photographing. This arrangement of rings and mirrors make a photograph of such clearness that it is very difficult to tell whether the camera is reproducing the original ring or whether it is reproducing the reflection of the ring in one or more mirrors. The first thought that strikes the recipient of this set of photographs is to reason out the arrangement of the mirrors to make the rings show up in the manner which they do. After giving the different photographs the necessary thought to determine this feature, it will be very safe to assume that the trade mark "Mirror Rings" is indelibly stamped on the mind of the man who has taken this trouble. Those who have not received a copy of this issue of *Cotton Chats,* would be well repaid for the trouble of sending for one if it could be secured.

BOOK REVIEWS.

Man Or Machine, Which? by Al Priddy, 111 pages, 75 cents net, postage 8 cents. Published by The Pilgrim Press, 14 Beacon St., Boston, Mass.

In the first chapter of this work the author has revived and typified the old feeling of hatred of the man toward the machine which has come down through all the ages since the earliest invention of labor-saving machinery. "This is a machine age," says the author, "and from the chattering alarm clock which interrupts our dreams in the morning to the automobile which hums us home from the party at midnight the gap in our day is crowded with our helpers, machines." He shows that the average workmen, whenever they see machinery producing materials that were formerly made by hand, doing it quicker, cheaper and more perfectly and with less effort, it begets in them a fear which is almost a creed, that machinery will more and more rob them of their initiative; that machinery will take away the dignity from labor. When this power gets control of the men, not only the machinery but the employer, the owner of the machines, the stockholders and the manager, becomes the target of their illegal conspiracies and the object of anarchistic philosophy. Says the author, "Stop that man who carries the red flag and ask him the reason for all this riot and unmoral treatment of orderly laws, and he will reply mainly because the machine is mastering us and will master us if we don't fight." Then the author goes on to show that the further influence of the machine on the operatives is to weaken the bonds of loyalty between the man employed and the employer. This is principally because the part taken by the man and his individual machine performs only an infinitesimal part of the work neces-

sary to produce a finished product, and therefore, according to the author, the man loses interest in his work because he is not producing a finished product. This theory is, however, wrong, to a large extent, inasmuch as each man does produce a finished product. He may perform only one operation on that product, but that operation must be performed correctly and in the best possible manner. An operative may be running a finisher picker, for example, and while his only operation is to handle laps from the breaker picker and run them through his machine and turn them out into the other laps for use on the cards, still it is very necessary that those laps should be even, should be of the correct weight, and that the machine which he operates should produce these laps in as nearly a perfect manner as possible and clean the cotton to the greatest possible extent while so doing. If a man has ambition; if a man desires to make of himself an able and expert operative; he will think not of the fact that the machine is preparing the cotton much faster and better than he could possibly do it by hand, but he will try and see how great a quantity of laps, perfectly prepared, it will be possible for him to secure personally, through the medium of that machine. Formerly all knots on the spoolers were tied by hand, while today, in nearly every mill, one will find the girls equipped with an ingenious little device attached to the hand, which ties the knot instantly and clips the ends to a certain specified length. Traverse the mills of the country; question the spooler tenders North and South, and how many operatives will you find that would exchange their present knotters for the old-fashioned finger-tied knots? One can safely say none.

In a further chapter the author indicates the effect of the machine on the employer to be also of a disastrous nature, inasmuch as it tends to make the employer lose both the economic interest in the man as an employe and the human interest in him as a man. However, in still another chapter he admits that the suggestive result of any careful study of the modern industrial situation reveals the fact that no matter how complex machinery shall become, the working man will always be left to master the machine. He praises the standpoint of the employers who make a distinct practical appeal to the operatives to use their inventive ability and make suggestions to him for either the improvement of the machine or the product. Many up-to-date plants have now adopted this plan, and no doubt others will in the future. The second practical method that appeals to the author is that being made by many keen industrial leaders in offering substantial aid in the way of assisting their workmen to secure patents on their inventions and perhaps in the marketing of same. The author then discusses man's economic and moral mastery of the machine and finally pictures the new employer. "An employer who must not only have scientific technical training, but must also be scientifically trained in moral economy, psychological insight, sanitation, ethics and domestic culture." In other words, idealism is to pay dividends. Modern so-called welfare work brings its own reward. This book will be found worthy of attention by mill managers and department heads, largely because it presents all the phases of the question in a straightforward way. 'It permits the reader to get an insight into the point of view of the different factors in modern manufacturing, and while some of its features are perhaps slightly overdrawn, as a whole, it will accomplish the desired results.

THE SACO-LOWELL MERGER.

The stockholders of the Lowell Machine Shop recently voted to increase the capital stock for the purpose of purchasing the plant and business of the Saco-Pettee Co., Saco, Me., and Newton Upper Falls, Mass. The new company will be known as the Saco-Lowell Shops. With exception of Vice-President James C. Howe, formerly general manager of the Lowell Shops, the officers of the new company are the present officers of the Saco-Pettee Co., including the following: President, Henry S. Shaw; treasurer, R. P. Snelling; general agent, Frank J. Hale. Robert F. Herrick, former treasurer of the Lowell Shop, will be chairman of the board of directors. The latter has the following members, in addition to the officers named: Harcourt Amory, Seth M. Milliken, Charles E. Rogerson and Wilmot R. Evans.

It is understood that the present plants of both companies will be continued, but that each will run on the machinery it is best equipped to produce. The Lowell shops have recently been largely reorganized and re-equipped. Extensive additions are being built at the Upper Falls plant of the Saco-Pettee Co. The shop management of the new company will remain as at present. Executive offices will be in Boston, and there will be Southern offices in Atlanta, Ga., and Charlotte, N. C.

A. H. Washburn, of Charlotte, N. C., who has been Southern agent for the Saco-Pettee Company and its predecessor for the past 14 years, has resigned his position and will not continue as Southern agent for the new company.

Succeeding Mr. Washburn as Southern manager of the merged companies at Charlotte will be Rogers W. Davis, of Atlanta, who has filled the office of representative of the Lowell Machine Shops for several years.

The general executive offices of the SACO-LOWELL SHOPS in Boston will be in the Columbian National Life Insurance Co. building (now under construction), Franklin street, after January, 1913, and are now temporarily in the First National Bank building, 60 Federal street, Boston.

There are still some textile manufacturers who use tallow as a softener. They ought to make a trial of the soluble softening oils, made by the ARABOL MFG. CO., 100 William St., New York. They will be astonished at the smooth finish of the warps, the easy parting of the threads in the lease rods, the bright and clean appearance of the slasher cylinders. Especially fine results they would observe with close woven goods, such as corduroys, velveteens, sateens, umbrella cloths, cambrics, etc. The seasons have no influence on soluble softening oil, say the manufacturers, and it remains sweet, uniform and pliable summer and winter. It is neutral and easily blended.

At the regular monthly meeting of the board of directors of the JOSEPH DIXON CRUCIBLE CO., held recently, the following changes in the officers and board of directors were made on account of the death of Vice-President William H. Corbin:

George E. Long, former treasurer, was elected vice-president to succeed Mr. Corbin; J. H. Schermerhorn, former assistant secretary and assistant treasurer, was elected to membership in the board of directors and treasurer of the company. Albert Norris was elected to the office of assistant secretary and assistant treasurer.

Barrett Specification Roofs

A Mile of Barrett Specification Roofs

The wonderful Bush Terminal in Brooklyn, N. Y., illustrated below, includes, 181 buildings, comprising tremendous warehouses, enormous pier sheds for docking ocean steamers, huge factory buildings, a large modern power house and an enormous freight structure.

These buildings stretch for a mile along New York harbor. Their total roof area is 3,100,000 square feet—more than seventy acres.

This entire area was covered with Barrett Specification type of roofs, for the following reasons:

1. Low first cost.
2. No maintenance expense, such as painting, etc.
3. They are not injured by steam, gases and acid fumes.
4. They are fire retardent and take the base rate of insurance.
5. The net unit cost, that is, the cost per foot per year of service, is lower than that of any other type.

Although some of the buildings are fifteen years old, the roofing contractor states that the expense for maintenance of this entire roof area has been less than $10.00. He estimates that if metal or ready roofings had been used, it would have been impossible to keep the buildings free from leaks and that the painting bill alone up to date would probably have amounted to at least $50,000.00.

We wrote to the Bush Terminal Company, asking what they thought about Barrett Specification Roofs. The Vice-President replied:

"We use this kind of roofing because our experience has shown it to be the best and cheapest. Our analysis of first cost of application and cost of maintenance entitles us to speak with some measure of authority."

We shall be pleased to mail architects, engineers or owners of buildings copy of the Barrett Specifications with diagrams from which blue prints can be made. Address our nearest office.

Barrett Manufacturing Company

New York, Chicago, Philadelphia, Boston, St. Louis, Cleveland, Pittsburgh, Cincinnati, Kansas City, Minneapolis, Seattle, Corey, Ala. **The Paterson Mfg. Co., Ltd.**:—Montreal, Toronto, Winnipeg, Vancouver, St. John, N. B.; Halifax, N. S.

TRADE B MARK

Special Note.

We advise incorporating into plans the full wording of The Barrett Specification, in order to avoid any misunderstanding

If any abbreviated form is desired, however, the following is suggested.

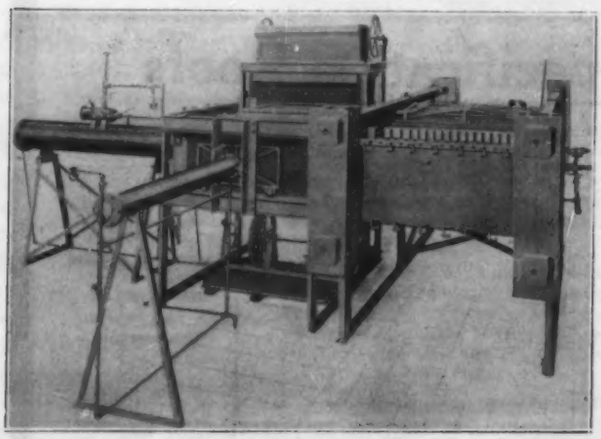
ROOFING:—Shall be a Barrett Specification Roof laid as directed in printed Specification, revised August 15, 1911, using the materials specified, and subject to the inspection requirements.

A GIN COMPRESS.

The accompanying illustration shows a gin compress which packs and bales the cotton ready for shipment to the cotton mill, or for export without further handling. This method saves time, storage, transportation, freights, sampling, etc.

A density of thirty pounds per cubic foot and a square, well-covered bale is obtained as against twenty-two pounds per cubic foot and a loosely covered bale by old style compresses. The press will handle the cotton from any number of gins up to six. The operation is a continuous one for gins, packer and press.

The cotton is received from the gins into a hopper from which it is automatically and systematically fed into a packer box. Here it is packed under steam compression



until five hundred pounds of cotton has been received, and then instantly transferred to the press where it is quickly compressed into a bale under hydraulic pressure. The operation is a mechanical one from the time the cotton is received in the packer hopper until the bale is dropped onto the floor with the exception of fastening the ties, which is done by hand in the usual manner.

The systematic and uniform method of packing the cotton before it is transferred to the press rids the cotton of all air pockets, and insures a uniform bale in size and shape. Both ends of the bale being open during the process, allowing the air to be expelled, removes all danger of bursting the ties while in storage or transit.

This is but one of the numerous styles of presses manufactured by THE HYDRAULIC PRESS MFG. CO., of Mt. Gilead, Ohio. This concern makes a specialty of hydraulic presses and pumps for high pressure purposes. They also design presses for special requirements.

We are just in receipt of a very interesting copy of *Cortright's Metal Shingle Advocate.*

This is a monthly publication issued in the interests of good roofs, and we suggest that you write for a copy of the Advocate, if you are contemplating re-roofing or building a new property. It is free, and sent postpaid. Write to Cortright Metal Roofing Co. 50 North 23rd Street, Philadelphia, Pa.

S. H. Smith has been appointed Southern agent for the STEEL HEDDLE MFG. CO., of Philadelphia. Mr. Smith is a graduate of the Textile School of the A. and M. College, Raleigh, N. C.

ALUMINA SOAPALITE.

Alumina Soapalite is a new detergent in powdered form for use in laundries, and textile mills where washing and bleaching is done, for adding to all kinds of soap to improve the quality, and, in fact, in any place where soap, soda or alkali is used.

It is made by combining the oxide of the metal Aluminum with other minerals in such a manner that the product combines chemically with alkali forming a new substance which they call Soapalite. It is really a mineral soap. It is not simply a new mixture, but it is a new chemical compound or substance.

Alumina Soapalite has double the cleaning energy of the best fat soap, and this is the reason: As is generally known, fat soap splits up when dissolved in water into acid and alkaline salts. It is the alkali of the alkaline salt which does the cleansing. The alkali in the presence of greasy dirt combines with fatty or vegetable substances and becomes an inert salt when it is saturated with such matter. The above action is also true of Soapalite. When treated with water we have the mineral acids combined with the alkali in solution as an alkaline salt, and since the detergent value in Soapalite is about double that in fat soap and is capable of combining with the acids of grease or oils the same as the alkali in soap, it is evident that this additional amount of alkali serves as a relay and gives Soapalite a double cleansing energy.

The manufacturers claim that what they have accomplished in the manufacture of Soapalite is the holding of the alkali bound to the alumina and other minerals until it actually comes in contact with grease and this enables them to put what is equivalent to a larger amount of alkali in the Soapalite without running any risk of attacking the fabric being washed and yet obtaining the benefits that would otherwise come from the use of free alkali.

Alumina Soapalite in proper proportion will not injure the most delicate fabric and can be used alone, and with soap in any proportions and to displace soda, borax, or potash, its detergent power being far greater than soda or borax and its use safer than potash. It is manufactured by the ELECTRIC SMELTING AND ALUMINUM CO., Lockport, N. Y.

Inquiries about anything pertaining to the textile industries will be cheerfully answered by COTTON.

MILL NEWS

Notices of mill projects, additions or improvements are solicited for this degartment

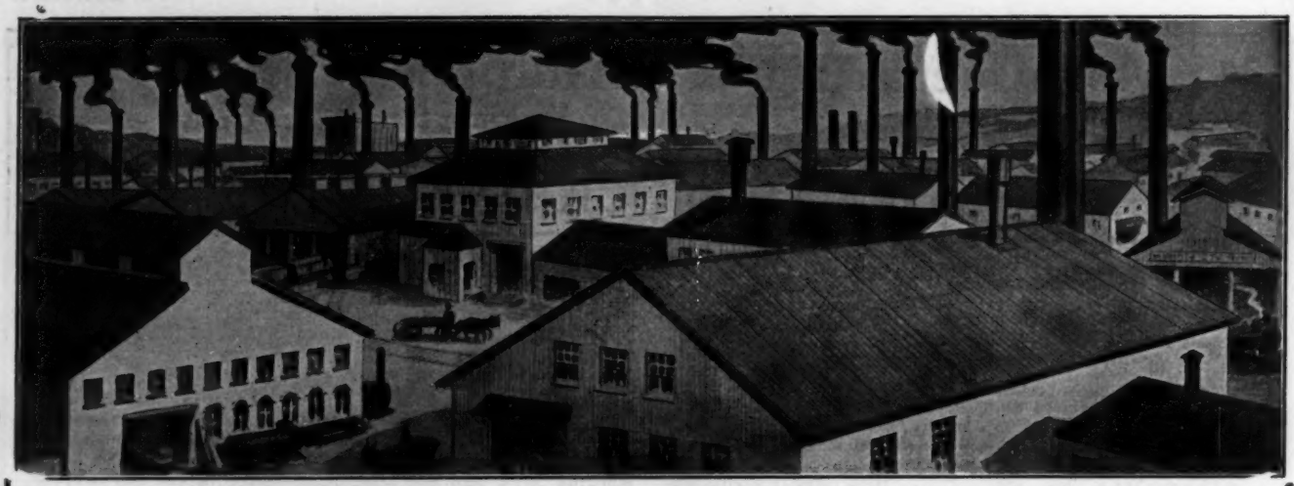
ALABAMA.

TUSCALOOSA. A mill is to be established at this place for the manufacture of shuttles. Land has been leased and operations on the buildings will be started shortly. J. M. Price and F. B. Taylor, of Hattiesburg, Miss., are behind the project.

FORT PAYNE. It is reported that the Buster Brown Hosiery Mills have awarded a contract for additional machinery which is to be installed in its plant here.

HUNTSVILLE. The old spinning frames of the Abingdon Mills are being displaced by new up-to-date machinery. Some new card room machinery is also being installed.

JACKSONVILLE. William P. Hazelwood, of Boston, Mass., and associates who recently purchased the Velina Mills are planning to engage in the manufacture of cotton yarns. It is understood that they will take out the 200 looms at present in the plant and install an equipment of 5,000 spindles and accompanying machinery.



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RU-BER-OID ROOFING

Some of these imitations look like RU-BER-OID but that is merely on the surface. The roofing buyer cannot see what is underneath, or he would not be fooled in buying goods on their appearance only.

As a house built on a poor foundation cannot last, neither can a roofing founded on poor material give the service expected of it.

Take None but the Genuine

RU-BER-OID

Accent on the "RU" and always spelled with one "B"

Unless the RU-BER-OID Man is shown on the outside wrapper, the roofing is not the genuine RU-BER-OID

KA-LOR-OID

(Colored Ruberoid) ROOFING

RED---BROWN---GREEN

The permanently colored prepared roofing

The ideal roofing for Bungalows, Cottages—in fact suitable for any building where artistic effect is desired.

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CONNECTICUT.

DERBY. The Hartford Knitting Co., who recently moved to this city, have purchased $8,000 worth of additional machinery from the A. H. & C. B. Alling Co.

GEORGIA.

ATLANTA. The American Tape Co. has recently been incorporated and is organized at $50,000 capital stock. Sims Bray is president and treasurer; J. R. Mobley, vice president; and John Hill, secretary. This company has installed machinery and will run by electric power.

BARNESVILLE. The Aldora Cotton Mills, of Barnesville, are having some additional tenement cottages built in its village for the use of the operatives.

COLUMBUS. The Merkas Mills, of this city, has definitely decided to increase the equipment. This increase will bring their total spindleage up to 25,000 with additional increase in looms to take care of the other machinery. This means approximately the addition of 14,000 spindles and 300 looms.

MACON. The Manchester Mfg. Co., of this city, is replacing some of its old equipment by new.

ILLINOIS.

QUINCY. L. C. Barns, representing Eastern capitalists seeking a site for a cotton mill to employ approximately 1,000 operatives, has telegraphed to the Chamber of Commerce that Quincy has been chosen for the location. Residents of this city are to contract and subscribe for one-half the capital stock.

MARYLAND.

BALTIMORE. The contract for the new warehouse building of the Mount Vernon-Woodbury Cotton Duck Co., which was mentioned in a previous issue, has been awarded to the Aberthaw Construction Co. The warehouse will be of reinforced concrete.

MISSISSIPPI.

WESSON. It is reported that the Mississippi Mills of this city have been sold to English capitalists. The mills have not been in operation since the early part of 1911. They are equipped with 16,496 spindles, 614 looms and equipped with steam and dyeing plants.

MISSOURI.

ST. LOUIS. It is reported that the machinery for the St. Louis branch of the Lowell Bleachery, of which much has been heard in the past year or so, is practically all finished and that this Western branch will soon be ready for operation.

NEW YORK.

NEWBERRY. Ground has been broken for another addition to the plant of the Chadwick Bleachery of this place. Two additions have already been made within a few months past and still another is now under way. The new buildings are to be used for additional space in their dyeing and bleaching.

KINGSTON. The Kingston Knitting Mill has been incorporated to deal in knit goods.

NORTH CAROLINA.

MONBO. The Turner Mills Co., has let contracts for the building of five new houses for the use of its operatives.

SALISBURY. Another enterprise which will be launched in Salisbury soon is known as the Meridith Hosiery & Mfg. Co., of which W. L. Horah is the principal stockholder. This new concern will operate in a building on North Long street. The plant is to be run by electric power and will manufacture half hose, ladies' and misses' ribbed hose.

CHAPEL HILL. It is reported that the Thomas F. Lloyd Mfg. Co., of this place, which plant was completed in April, 1911, and which is capitalized at $200,000, has been bought by the Durham Hosiery Mills who already have one mill in operation at this place.

BURLINGTON. The equipment of the Sellers Mills at this city have been considerably increased by the addition of 20 machines.

ROCKINGHAM. The PeeDee Mfg. Co. has recently added a Psarski dyeing machine to its equipment. This is the fourth machine of this kind to be installed by the PeeDee Co.

MONROE. The Monroe Cotton Mill is to have an addition built to its present plant to accommodate 5,000 spindles and 60 looms.

OHIO.

CLEVELAND. The Fashion Knitting Co., of this city, has been incorporated with a capital stock of $10,000.

PENNSYLVANIA.

EASTON. New carding, new spinning, and winding machinery has been installed at the Chipman Knitting Mills of this place. This new machinery will practically double the capacity of the plant. The new dye house is also being erected which will be used for dyeing silk hosiery.

PHILADELPHIA. The Royal Knitting Mills, manufacturers of sweater coats, and Evans & Stoneley Knitting Mills, also manufacturing sweaters, at Germantown, are to be consolidated. The combined mills will be operated under the name of The Royal Knitting Mills, and the plant now located in the city will be removed to the plant in Germantown. B. Robbins is president of the new company and he recently purchased the old West Knitting Mills in the rear of the Germantown plant. They also propose to erect a new mill in the near future.

ROBESONIA. The Robesonia Knitting Mills are to build an addition to their present structure 35 by 40 feet.

PHILADELPHIA. The Brown Knitting Co., is to enlarge its plant by the addition of another story. Contract for the work has already been awarded and the cost of the addition will be approximately $35,000.

MILTON. Announcement has been made that the West Branch Knitting Co., of this place, will greatly increase its output. Arrangements for the installation of new machinery is under way and 140 new machines will be installed in the part of the plant that has been known as the spinning mill. These machines will be electrically driven and the increased output of the plant will amount to 250 dozen pieces of underwear a day.

RHODE ISLAND.

SMITHFIELD. The Abedore Weaving Co. has recently been incorporated to manufacture, dye, print and finish textiles. It is capitalized at $100,000. The incorporators are T. F. Green, Frank L. Hinkley and Frederick W. Tillinghast, of Providence.

SOUTH CAROLINA.

GREENVILLE. The Woodside Cotton Mills have recently awarded a contract to Fiske-Carter Construction Co., to erect an additional building of slow burning mill construction five stories high, to cost approximately $100,000.

KERSHAW. The contract for the erection of the new Kershaw Cotton Mill has been let to the Gallivan Construction Co., of Greenville, S. C.

TENNESSEE.

HARRIMAN. It is reported that the management of the new Harriman Hosiery Mill has leased a large building in which a school is to be established for teaching girls how to knit hosiery. The necessary machinery will be installed and a large number of girls will be taught in order to have a large force in readiness when operations are started at the new plant. The progress on the plant is being rapidly made, and the buildings are nearly completed. A 150 H. P. steam plant is also being erected.

PRENDEGAST. The new mill, which was reported as being planned for Prendegast, has placed all its contracts and is now outlined to be about as follows: The building will be of standard mill construction 187 by 160 feet. The equipment will include a 440 H. P. electrical plant, 10,000 spindles with accompanying machinery for a daily capacity of approximately 4,000 pounds of ply and hosiery yarns.

CROSSVILLE. J. S. Reed is interested in a plan to establish a hosiery knitting mill at this place. It is reported that experienced knit goods manufacturers are to manage the enterprise and propositions are being submitted for a plant to cost from $70,000 to $75,000.

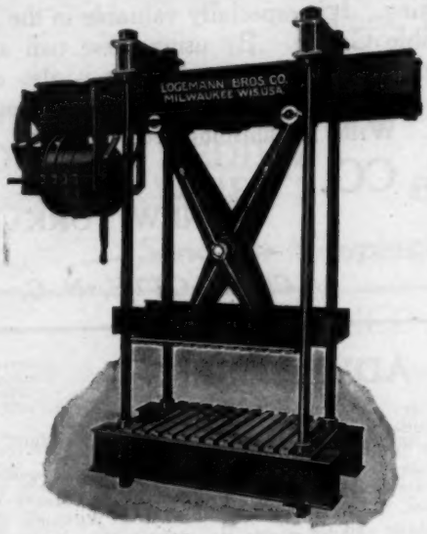
SOUTH PITTSBURG. The new addition to the Aycock Hosiery Mills when completed will necessitate the management doubling its present force. This mill employs at present about 300 boys and girls, and is located near the station of the N. C. & St. L. Railroad.

VIRGINIA.

DANVILLE. The new addition for the Riverside and Danville Cotton Mill Co., is already under way. The work of excavating a foundation for the new mill is being done and 150 new tenant houses are also being built. This company recently placed a contract for painting the entire 600 tenement houses belonging to the company.

REDUCE COST

of your baling by installing modern Balers that will save time, labor and power. You would not use cumbersome, ancient machinery in your other departments, why not economize in baling?



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We guarantee more efficiency with less power than any other press built.

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In every class of building construction, from the smallest dwelling to the most pretentious structures, CORTRIGHT METAL SHINGLES will combine wonderfully attractive appearance with a protection against storm, wind, lightning or fire, that cannot be procured through the use of any other roof covering.

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Roofs put on over a quarter of a century ago are as good as new today, and have never needed repairs. Don't compare them with cheap imitations; they're strictly in a class by themselves. Insist upon having the "Cortright."

Send for samples, prices and catalog before deciding the roofing question.

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ARE YOU USING "AMERICAN ANILINE COLORS?"

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ANTIMONY LACTATE.

¶ As has been widely noted there has been a very sharp advance in the price of Antimony Oxide. Without dilating on the cause of this advance it is of especial importance to users of Antimony products as mordants because they, too, will doubtless advance. In the average Antimony product used for mordanting only a comparatively small percentage of the Antimony Oxide it contains is available, the rest is lost, because of the excessive acidity of the bath.

¶ All the Antimony Oxide in ANTIMONY LACTATE is available, hence it is particularly the mordant to use with an advancing Antimony Oxide market.

AVERY CHEMICAL CO., 88 Broad St., BOSTON

Weightening Softner

A SOLUBLE GUM to be used in either Sizing or Finishing. It is especially valuable in the finishing of cotton fabric, when used together with Bradford Soluble Grease. By using these two articles any desired finish may be had, when used in the proper proportions. Weightening Softner is also an excellent binder for weightening materials. Manufacturers of tickings use it extensively for this purpose in conjunction with China Clay. It does not gum the pins. Write for finishing recipe.

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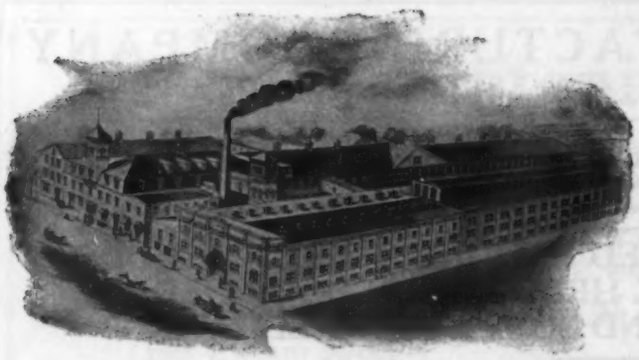

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Sargent's Sons Co., C. G.
Schofield Co., Wm.

Waste Washing Machine.
American Tool & Mch. Co.

Water Filters.
Hungerford & Terry.
Norwood Engineering Co.

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Nowhere else in Philadelphia will you get the same homelike atmosphere that you will at The Rittenhouse.

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Milk, vegetables, poultry, eggs and drinking water from our Big Spring Farms in Chester County.
An exclusive cafe—cuisine and service of the highest standard.

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Special Softeners for Cotton, Hosiery and Wool

A practical experience both in Europe and this country enables us to meet every technical requirement and positively guarantee a superior result. We can show you how to improve the finish of your goods. We are selling to the largest textile mills and shops in this city.

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The rate for "Positions Wanted" and "Help Wanted" advertisements of 40 words or less is one dollar an insertion; additional words two cents each, payable in advance. Remittances and copy should reach this office not later than the twenty-fifth of the month.

Replies may be sent in care of COTTON, Atlanta, Ga.

WANTED—One second-hand spinning room, one second-hand twister room, two spinning room fixers. Mandeville Mills, Carrollton, Ga.

WANTED—A position as assistant superintendent, manager or cost accountant in large cloth mill; young man 26 years old, textile graduate with 5 years mill experience; 2 years as superintendent of small mill. Address "C," care Cotton.

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We would like to correspond with a Mill that manufactures 46" Enameline Duck, which will sell part of production for Cash to a Corporation using about 300,000 yards a year. Address DUCK, care Cotton.

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40 National Spring Needles 200 needles 3½ in.
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We also have a REMNANT DEPARTMENT Conducted on High Class Lines.

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FOR HOME AND EXPORT MARKETS

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Cotton Mercerized Tapes, Spool Tapes, Bindings and Narrow Fabrics For Underwear and other Trades.

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OF ALL KINDS IN ANY QUANTITY

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Protect the Cotton.

Use

"IMPROVED BRILLIANTINE"
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CLARAGE COTTON FANS

are the most mechanically perfect fans built.

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In drives of 200 h. p. and up, and where the shafts are more than 30 feet center to center, the cost of rope drive will be from 15 to 50% less than that of belts, according to distance and size of drive.

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This is the most complete reference book we know of, on rope driving—it's really a text book for the engineer. Ask for a free copy today.

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For metal surfaces has never failed to tell the same story of protection and durability.

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It is nature's combination, mined only by us at Ticonderoga, N. Y. It LASTS LONGER, saving you money in labor and material. It is an efficiency paint.

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We carry a complete line of
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FIFTY LARGE SAMPLE ROOMS

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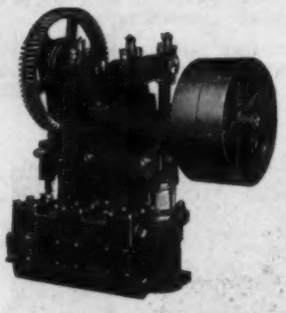
Are Installed in Many Plants where the Principles of "Scientific Management" Prevail.

THEY CUT STEAM COSTS



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Hand and Power Pumps for All Uses

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They lubricate themselves. Used on all kinds of machinery. They mean

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Over a quarter of a century of satisfied customers.

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is made from Cotton and Balata only. The duck which is the base of the belt is of the heaviest and to this is due the life of the belt.

It is thoroughly frictioned together and then stitched. The sewing makes it impossible for the plies to come apart. The surface is coated with pure Balata gum.

"CHEBECO"

will save you money because it will save you power; because it does away with belt-dressing; because "taking up" is reduced to a minimum; because it is water-proof and will wear indoors or out; because it does not deteriorate with age; because it lasts longer than any belt you have ever bought.

THE CHESAPEAKE BELTING CO.,
BALTIMORE, MD.

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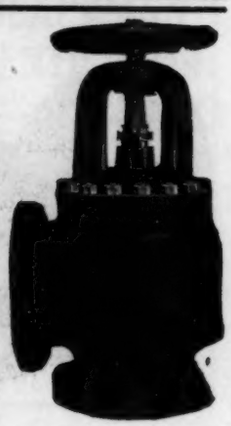
"Reliability Their Main Feature."



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We make pressure controlling, pressure regulating, devices of known quality—valves that are of rugged construction, sensitive, accurate, efficient and above all thoroughly reliable.

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IT WILL PAY TO READ AND DIGEST THIS DESCRIPTIVE CONSTRUCTION OF A MOST SUPERIOR VALVE.

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NASON STEAM TRAPS

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NASON Steam Traps give no trouble. They are simple in construction and easily accessible. All parts are interchangeable.

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The Foster Superheater has many advantages in the way of saving fuel, of increasing efficiency of engines, boilers, pumps, etc., and of general economy, and we want the opportunity to lay its merits before all steam plant owners.

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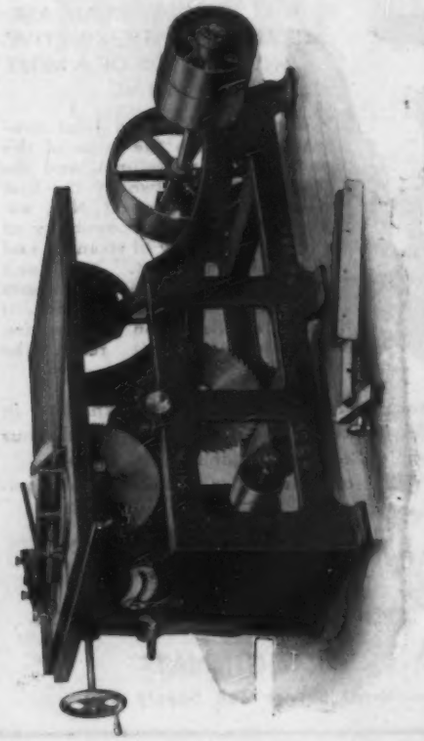

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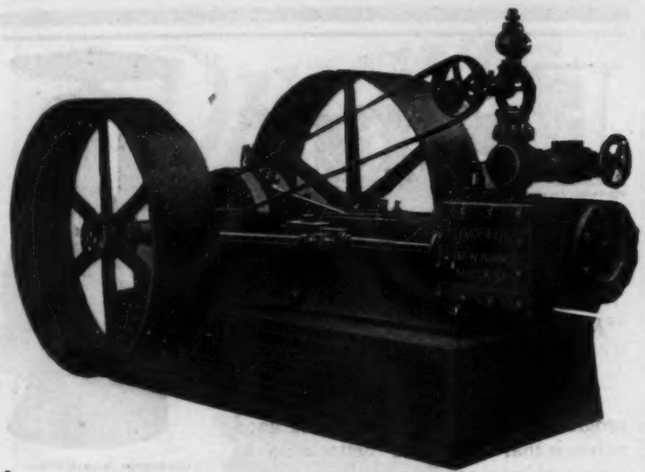
Branches: New York Chicago Atlanta San Francisco



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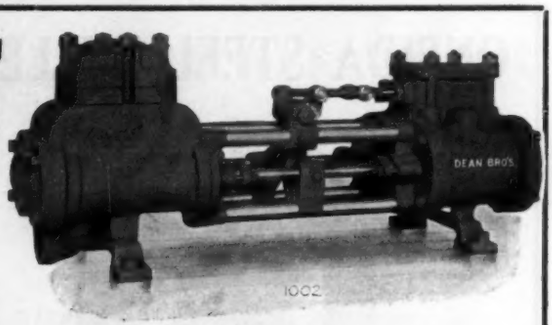
FORGED STEEL HYDRAULIC PRESSURE PUMPS

PUMPS FOR ALL SERVICES



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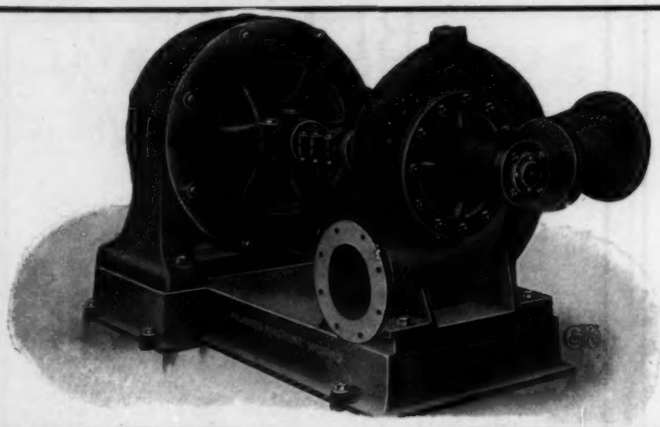
This pump has the simplest valve movement that has been devised for duplex pumps.



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BALDWINSVILLE, N. Y., and CHARLOTTE, N. C.

Centrifugal Pumping Machinery

For Cotton and Woolen Mills, Dye Houses, Bleacheries, Etc. Send for Catalogue and prices. . . . . .

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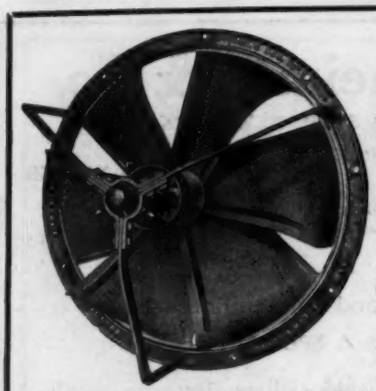
H. A. PAINE, Agent, - HOUSTON, TEXAS.

HENION & HUBBELL, Agents
223-231 North Jefferson St. - - Chicago, Ill.



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Removes Heat, Steam, Gases
Cools, Dries, Purifies

Reward of Merit.
Over 9,500 in use.

If you have trouble in your Acid, Dye, Engine or Drying room, we prescribe the Blackman Ventilator as a remedy. Consultation free. Send for highly interesting Catalogue to manufacturers.

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High Pressure Boilers built to Insurance Specifications. Rivet Holes Punched or Drilled. Pumps, Injectors, Pipe, Mill Supplies, Castings.

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Foundry, Machine, Boiler Works and Supply Store,
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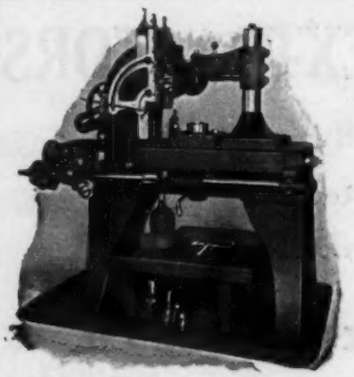

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Gear Cutting Machines!

ESPECIALLY ADAPTED FOR USE IN COTTON MILLS. HUNDREDS NOW IN USE. SEND FOR SPECIAL CIRCULARS.

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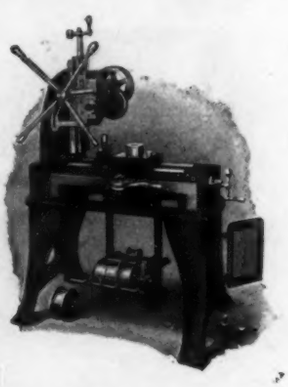

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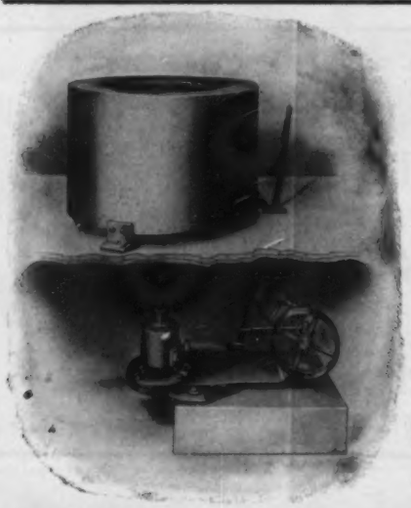

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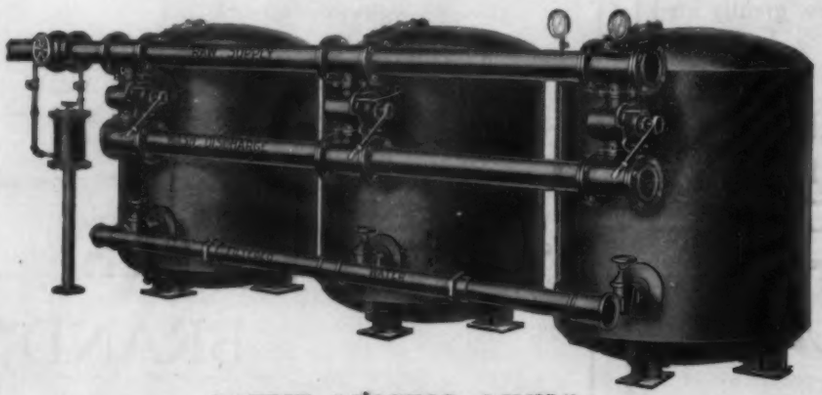

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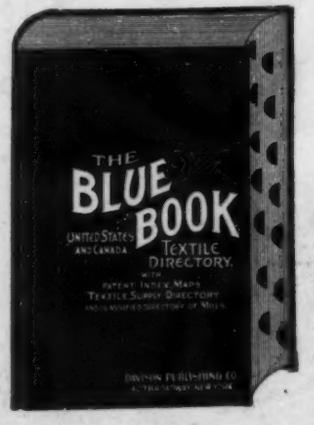

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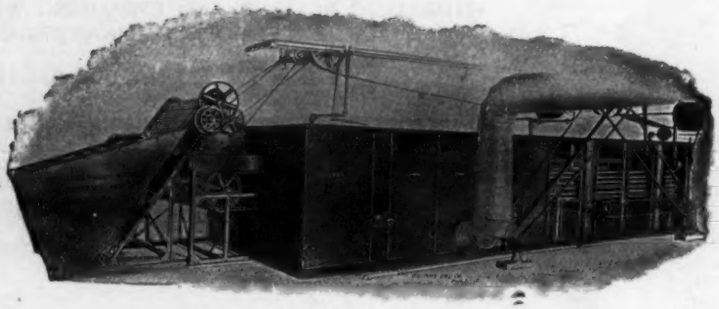

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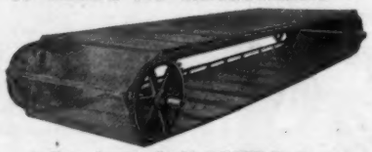

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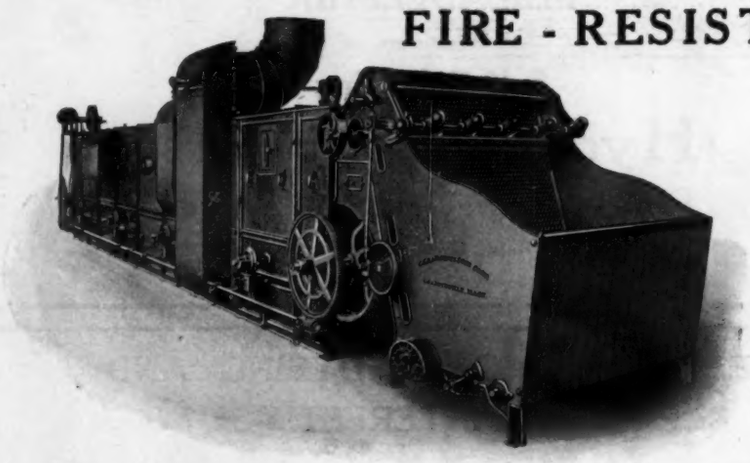

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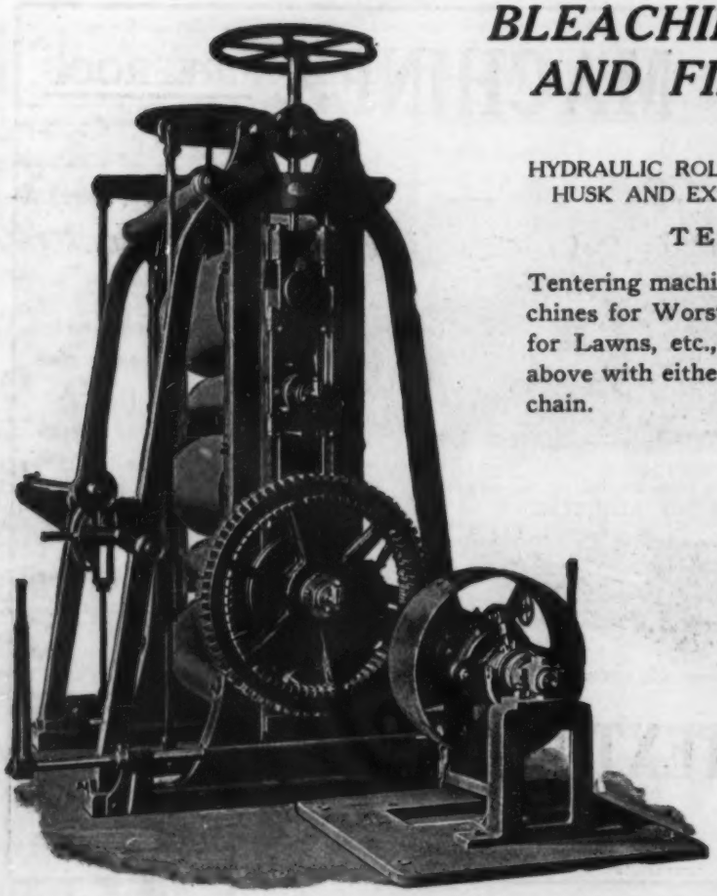

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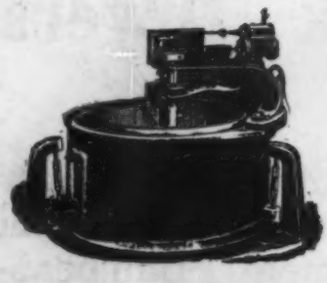

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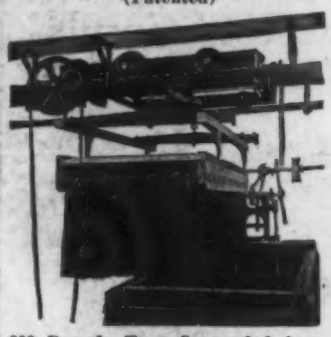

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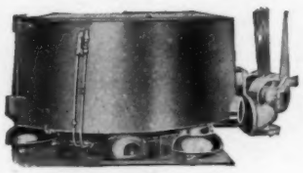

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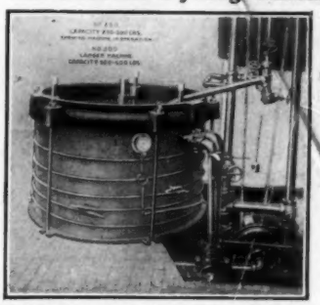

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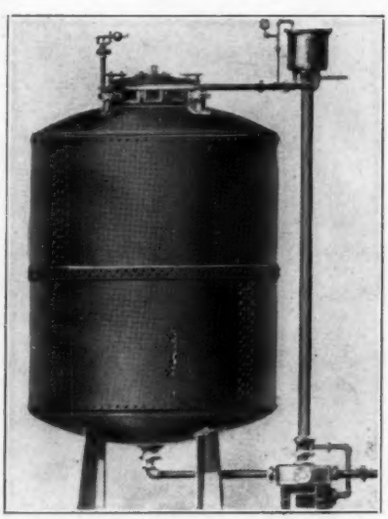

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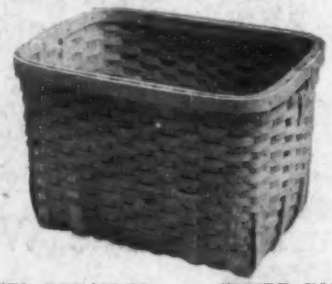

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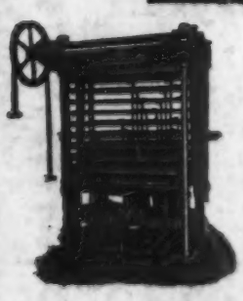

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